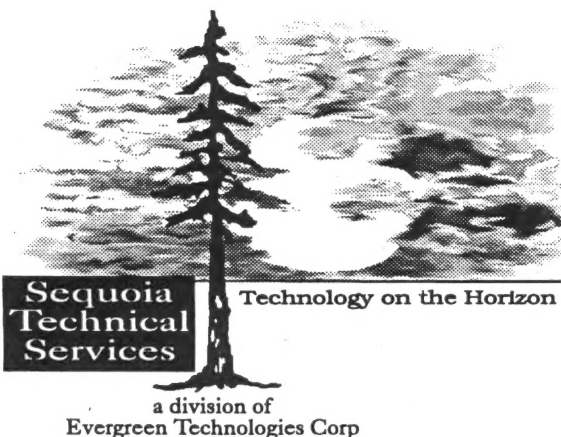




Sequoia Technical Services Company



Cruising the Internet



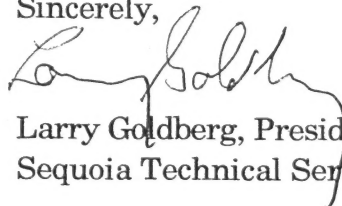
Dear fellow Internaut,

Thank you for choosing to enter the Information Age by joining us in exploring the Internet. As you are well aware, the Internet is quickly becoming the Information Superhighway of the world. It will soon be possible to shop online, conduct business online and even send and receive videos and other electronic media through the Internet electronic network.

One of the most compelling reasons for people in this region to take advantage of the Internet is to overcome rural isolation and, moreover, harness the telecommunications revolution to redefine economic opportunities in rural areas.

At Sequoia Technical Services Company our motto is "working smarter, not harder." We hope that this workshop is a living example of our motto which you can take with you to improve your work and life. We look forward to continuing to provide you with high value services to assist you as you become a full-fledged Internaut.

Sincerely,

A handwritten signature in dark ink, appearing to read "Larry Goldberg".

Larry Goldberg, President
Sequoia Technical Services Co.

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CRUSING THE INTERNET

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Sequoia Technical Services

Cruising the Internet workshop

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- Accessing via other systems
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- Future of the Internet...
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Entering The Internet

And Some Interesting Things To Do When You Get There

BY KEVIN M. SAVETZ

The Internet is a worldwide network of university, government, corporate, and private computers. Over a million machines are part of the Internet—no one knows exactly how many, because no one is in charge. This network is a cooperative, free, anarchistic entity. Internet users have hundreds of services at their disposal, including electronic mail, software downloading, databases to search, chat services, games, and bulletin boards on every imaginable topic.

Computers on the Internet communicate using a protocol called TCP/IP. A machine linked in this manner can exchange data with any other machine on the Internet.

The Internet's roots are in another network, the ARPANET, a group of United States military computers. The experimental ARPANET was developed in the late 1960s and 1970s by the Advanced Research Projects Agency, or ARPA. It was later divided into the ARPANET, designated specifically for research, and MILNET, for military use. Other computers were slowly added to the ARPANET, and other networks were folded in. Eventually, the ARPANET as a distinct entity ceased to exist—and the Internet was born. Today, the Internet grows at a staggering rate, with an estimated four hundred networks connected to it. As the cost of network-accessing hardware falls, and universities and businesses provide net access to scores of people at a time, the people using Internet are the mass public in what is becoming our global village.

So, how do you get on the Internet? Probably your local bulletin board isn't part of the Internet; though it may have message systems and games and whatnot, it doesn't have "telnet" and "FTP" and other programs that allow you to get interesting information from computers elsewhere. Some commercial services like CompuServe and America Online let users send and receive electronic mail from the Internet, but lack file transfer capabilities.

In order to use the Internet, you need an account on a computer that is connected to it. You use your modem to dial into the service and access your account. Several companies provide accounts for a fee, charging either per-hour or a flat monthly rate. Some universities give accounts gratis to students and faculty. It's best to find a service that's accessible with a local phone call, to keep your phone bill manageable. Some services allow nationwide access through a data net-

work such as Tymnet, but these networks carry an added hourly surcharge. Take the time to find a system that is nearby and within your budget.

COMMERCIAL SERVICES: A SAMPLER

Dozens of commercial services nationwide provide Internet access for a price. Space does not permit listing them all; however, here are a few companies that provide Internet accounts in the Bay Area:

A2I Communications offers accounts with access to a UNIX shell, electronic mail, FTP, telnet, and Usenet news. A2I charges a flat fee of \$20 a month, but offers discounts if bought in advance: \$45 for three months or \$72 for six months. There is no sign-up fee or connect-time charge. To access it, dial (408)293-9010 if your modem is v.32 or v.32 bis, or (408)293-9020 if not. Login as "guest."

CERFnet offers accounts to individuals and entire organizations with multiple users. Fees start at \$20 a month and \$3 hourly for off-peak calling, with a \$50 one-time installation fee. Users can call in from the local area, or using a nationwide 800 number for an extra fee. For information, call (619)455-3900 or 1-800-876-2373.

The videotext service **DELPHI** just added Internet capability in January. The service, which already had a broad base of users, says it is the first nationwide service to provide full Internet access, including electronic mail, FTP and telnet. DELPHI has two membership plans: the "10/4" plan costs \$10 per month and includes four hours of use; additional use is \$4 per hour. The "20/20 Advantage" plan is \$20 per month, includes twenty hours of use, and costs \$1.80 per hour for additional time. Rates apply for access speeds up to 2400bps; 9600bps access is currently being tested in some locations. The Internet service option costs an extra \$3 per month and allows users to transfer 10MB of data. DELPHI access during business hours via Sprintnet or Tymnet carries a surcharge.

Through a trial membership offer, anyone interested in trying to learn DELPHI and the Internet can receive five hours of access for free. To join, dial by modem, 1-800-365-4636. After connecting, press return. At the "Username:" prompt, enter JOINDELPHI and at the password prompt, type INTERNET. If you have questions, call 1-800-695-4005.

From Berkeley, **Holonet** features email, telnet, FTP, Usenet, and IRC, as well as other

services. Holonet costs \$6 per month plus \$2 an hour (off-peak) or \$4 an hour (prime time) plus network surcharges for those not using the Berkeley access number. Happily, the monthly fee goes toward the hourly charge. Holonet is available for \$60 annually, a \$12 savings over the month-to-month rate.

Although some online services charge extra for users of fast modems, Holonet charges based on how much you download—so those with fast modems can "browse" without feeling rushed. The data transfer charge is \$1 per megabyte during off-peak hours; \$2 per hour in prime time. Those who keep more than 100K online are charged an additional \$1 per megabyte per month storage fee. Call (510)704-0160 (voice) or (510)704-1058 (modem).

Of the services listed here, **Netcom Online Communication Services** offers local-call access from the widest area, covering San Francisco, Santa Cruz, Los Angeles and San Diego. The service, which offers a UNIX shell, FTP, telnet, IRC, Usenet feeds and other services, costs \$19.50 per month, plus a one-time signup fee of \$15. For information, call (408)554-8649 (voice) or login as "guest" using one of the modem dialups: (310)842-8835, (408)241-9760, (408)459-9851, (415)328-9940, (510)426-6860, (510)865-9004, or (619)234-0524.

The Portal System, with dialups in Cupertino and Mountain View, charges a monthly fee of \$19.95, with a signup charge of \$19.95. An additional charge of \$1 per megabyte per month is imposed on those storing large amounts of data.

To get information about Portal online, dial (408)725-0561 or (408)973-8091 and login as "new" or "help". If you prefer to talk to a human, call (408)973-9111. This service is also available nationally over SprintNet and Tymnet, at an additional cost from \$2.50 to \$10 an hour. Portal offers a UNIX shell as well as a menu-based interface (if UNIX scares you), FTP, telnet, IRC, Usenet feeds, and other services.

The Whole Earth 'Lectronic Link, or WELL, is one of the best-known Bay Area commercial computing services. It offers a UNIX shell, electronic mail, FTP, telnet, Usenet, and other services. The service costs \$15 a month, plus \$2 an hour. Long-distance usage through the CompuServe Packet Network costs an additional \$4 per hour.

To sign up online, dial (415)332-6106 and login as "newuser". (Callers from out of the area may wish to use the Packet Network; call

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1-800-848-8980 to find the nearest CPN number, then call that number and enter "WELL" at the prompt.) The WELL's voice information line is (415)332-4335.

If you are a college student or faculty member, check with your campus computer center to learn about the online facilities available to you. Many schools, including California State University and the University of California, offer free accounts to students and staff. The Free Software Foundation at Massachusetts Institute of Technology sometimes provides free UNIX accounts as well. However, the FSF is in the business of writing software, not handing out free computer accounts. It may take months to get an FSF account.

Computer accounts are not all alike. A vast assortment of machines—from tiny personal computers to huge mainframes—are on the net. Not every service provides access to the same functions. For instance, while many sites offer FTP, a program that allows you to download software from other computers, some sites do not, for security reasons or disk-space limitations.

Once you have an account on an Internet-linked computer, you use various programs as tools for communicating with people and services elsewhere. While this is not meant to be a complete Internet tutorial (whole books have been written for that) it is meant to get the Internet-novice going in the right direction.

ELECTRONIC MAIL

Electronic mail, or email, allows users to send messages from one computer to another in a manner of moments. Typically, a coast-to-coast email message can arrive at its destination in as little as one minute.

There are too many different electronic mail software packages to cover here, so ask around at your system for the details. Usually, an electronic mail "address" is in the form "user@computername.location". For instance, if your username (or login name) at the WELL is "fjones," you can receive email at "fjones@well.sf.ca.us."

TELNET

Telnet is a program that allows you to login to another computer to run software there. Typically, you login either to access a "shell" command environment or some other utility.

To telnet to a computer, you need to know its name. This can either be in words, like "steer.sdsu.edu" or as a numeric address, like "130.191.1.11". Some services require you to connect to a specific "port" on the remote computer. Type the port number, if there is one, after the Internet address. (For example,

"telnet nri.reston.va.us 185".)

When you connect to the remote computer, you will usually be asked for a login name. This isn't the same as the login to the account you are telnetting from—instead, you usually need to enter the name of the service you wish to access. For example, you might login as "bbs" if you know that a certain computer offers a public bulletin board service.

If your system has manual pages installed, type "man telnet" and "man ftp" for online documentation specific to your system.

ANONYMOUS FTP

Some systems provide a program called FTP, which stands for file transfer protocol. FTP allows you to copy files from a remote computer to your local host. Thousands of sites provide anonymous FTP service, allowing you to download everything from online books to satellite pictures of the weather to public-domain utilities and games for your personal computer. (Software for use on your home computer first needs to be FTPed to your local host, then downloaded to your PC using XMODEM, ZMODEM, Kermit, or some other system—a two-step process.)

FTP works similarly on most systems. To access a remote site, type "ftp" followed by the name of the computer. A good place to start is with "ftp wuarchive.wustl.edu". Wuarchive contains a vast selection of programs for UNIX, IBM, and Macintosh computers.

Once FTP connects to a remote site, you will be asked for a username. Type "anonymous" as a username and enter your electronic mail address for the password. This is done as courtesy to the system administrators, who need to know who is using their system. On some sites, "ftp" works as the anonymous username. The anonymous FTP system provides file access for people who don't actually have an account on a remote computer.

Note that not every site permits anonymous FTP access—don't try to access a system that hasn't been billed as a public FTP server.

If the site you are FTPing to allows anonymous access—and everything goes as planned—you should be greeted with a message like "Guest login OK." You then have a number of UNIX-like commands available to you—use these to change directories, list files, set the file type and download files to your local host. Standard commands include: "help"; "ls" to list the files in the current directory; "cd" to change the directory; "binary," which tells the computer that you expect to download binary files; "ascii," which tells the computer you will be downloading text files; "get <filename>" makes a copy of

the remote file on your local host; "quit" ends the FTP session.

Usually, there is a directory called "pub" where public files are stored. Type "cd pub" then "ls" to list what's available. You may wind your way through several directory levels before finding what you're looking for. For instance, on wuarchive, anti-virus software lives in "mirrors/msdos/trojan-pro".

TO LEARN MORE

Books for beginning to advanced Internet users are available—they can provide detailed information from how-tos to detailed technical explanations of the net.

Check out *The Whole Internet* by Ed Krol (published by O'Reilly & Associates) and *Zen & the Art of Internet* by Brendan Kehoe. Both books are aimed at the first-time user, covering the basics of the Internet, and lead into more advanced topics.

Also available is *The Internet Companion, A Beginner's Guide To Global Networking* by Tracy LaQuey with Jeanne C. Ryer (Addison-Wesley Publishing). The *Companion* includes a detailed history of the Internet, a discussion on "netiquette" (network etiquette), and how to find resources on the net.

Early this year, McGraw-Hill will release *The Internet Guide for New Users*, by Daniel P. Dern. Along with the obligatory topics such as telnet, FTP, and Archie, the book suggests how to get an Internet account and teaches enough UNIX skills for survival on the net.

Once you have an account, several good texts are available by FTP. "The Internet Companion," a beginner's guide to the net, is available by FTP from "world.std.com" in directory "/OBS/The.Internet.Companion". While you're there, download "zen-1.0.txt.Z" from the directory "/obi/Internet/zen-1.0"—this is an old, free version of Kehoe's book *Zen and the Art of Internet*. (Files that end in .Z need to be uncompressed with the Unix "uncompress" command before reading.)

Users who are more interested in the technical bits of the Internet will want to read *The Hitchhiker's Guide to the Internet*. This document, also written by Ed Krol, explains how Internet addresses work and discusses issues such as trust and carrying capacity of the Internet. The "Guide," as well as other useful texts for new users, is available from "wuarchive.wustl.edu" (128.252.135.4) in directory "/mirrors/EFF/internet-info."

FURTHER ADVENTURES AND USEFUL INFO

There are a lot of useful things you can do with the Internet. People and organizations have set up servers offering the public everything from daily stock exchange updates to

nuclear test data.

Here is a sample collection of Internet-accessible sources of useful information about the weather, geography, space, food and agriculture, and research tools. Most of these services are accessed using either telnet or FTP on your local computer. Telnet puts you in an interactive shell with a program at a remote site, while FTP allows you to download information or pictures for viewing on your local machine.

Weather And Geography: What could be more useful than up-to-date weather infor-

mation? The University of Michigan runs a public service, the Weather Underground, with enough information to put Willard Scott to shame. To access it, "telnet downwind.sprl.wmich.edu 3000" or "telnet 141.212.196.177 3000". The service prompts you for a three-letter city code (for example, EKA for Eureka, California) then speedily delivers a daily forecast for that area. (Rain, and lots of it!) It contains weather information for the United States, Canada, and some international cities.

The Weather Underground also provides

climate data for any United States or Canadian city, including 24-hour rainfall, total and average rainfall for the season, and record high and low temperatures. Here, too, you can search for information by the three-letter city code. Long-term forecasts, earthquake reports, hurricane advisories and marine forecasts are also available.

Not to leave well enough alone, the University of Michigan also offers a geographic server. Just "telnet martini.eecs.umich.edu 3000" or "141.212.99.9 3000", and enter the name of a city or its ZIP code. You'll find out the city's name, population, latitude and longitude, elevation, location, etc.

A short listing of recent earthquakes, date and time, including magnitude, location, and depth, is available with the command "finger. quake@geophys.washington.edu" (or "finger quake@128.95.16.50").

An auroral activity monitor is another service accessed using "finger" command. Use "finger aurora@xi.uleth.ca" or "finger aurora@142.66.3.29" for information about auroral sightings, warnings, and watches.

Some of us would rather look at the weather. If your computer can display GIF-format pictures, you can view striking up-to-date weather pictures. FTP to vmd.cso.uiuc.edu (128.174.5.98), login as "anonymous," change the directory to "wx" and use binary mode. You can then download satellite images of the earth and her weather. Visible and infrared images from the GEOS-7 satellite over the US and Mexico are available for the downloading, and are updated frequently. Surface analysis maps are also available.

The "wx" directory also contains useful documents, including "spotfreq.doc", listing amateur radio frequencies with weather information, and "chase-tv.doc" which lists television stations that provide useful information for storm chasers. Additionally, "wx-talk.doc" gives information about weather-related mailing lists on the Internet.

GEOS images over North and Central America are also available by anonymous FTP from ats.orst.edu (128.193.120.19). Satellite GIFs of Europe from Meteosat are updated twice daily at cumulus.met.ed.ac.uk (129.215.168.19.)

For more information, a guide to weather images, data, and meteorological, oceanographic, and geophysical research data is available by sending electronic mail to pit-manager.mit.edu. Include "send usenet/news.answers/weather-data" in the body of the message. You will receive a file detailing where to find information on the internet, on CD-ROM, and in mailing lists. However, most of the sources mentioned in the text are aimed at the scientific community.

Space: NASA offers a "headline news" service, including daily press releases and updates on space shuttle missions. To read it,

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Join the Internet!

Portal, the Bay Area's premiere Internet services provider, gives you unparalleled access to the Internet. Excellent value, the highest possible quality, and top notch customer support make Portal your gateway to the Internet.

SLIP/PPP

The Bay Area's *only* low-cost slip/ppp service lets you connect your pc, mac or UNIX machine to the Internet. Take full advantage of the Net with services like mail, ftp, telnet, and irc.

UUCP

Use the Portal UUCP Connection™ to get full UUCP access. We'll provide mail forwarding, customized news feeds, a domain name, documentation, and everything else you need.

Shell

Portal Shell™ accounts let you use the power of the UNIX shell to access the Internet, as well as network email, The Portal Archive™, Usenet newsgroups, and extensive software libraries. Plus, the menu-based Portal Online™ gives you an easy-to-use interface.

PORTAL

Portal Communications Company 20863 Stevens Creek Blvd. Suite 200 Cupertino CA 95014
408.973.9111 (voice) 408.973.8091 (data) 408.725.1580 (fax) cs@portal.com (email)

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"finger nasanews@space.mit.edu".

NASA also operates an Internet-accessible bulletin board system, NASA SpaceLink. It offers information about shuttle launches, satellite updates, and NASA news. Use "telnet spacelink.msfc.nasa.gov" (or 192.149.89.61) to access it.

Images from the Magellan and Viking missions, among other things, are available from "ames.arc.nasa.gov" in the directory "space/cdrom". Again, you need to be able to display the GIF-format images after you download them.

Food: All this poking around the Internet is enough to make a person hungry. Fortunately, the net can help you there, too. Although they haven't perfected a server to bring you food, you can learn all about food and nutrition using PENpages.

PENpages is a database which contains thousands of reports, newsletters, and facts about agriculture and consumer-oriented nutrition information. In most cases, the actual text of the research and newsletters is online and available for your immediate perusal. For example, a search for "vegetarianism" revealed two dozen articles about or referring to vegetarianism. The software is quick, easy to use, and offers lots of online help.

To use PENpages, telnet "psupena.psu.edu" (or 128.118.36.4). When asked for a username, type "OH" (for Ohio.) The system is self-explanatory.

If you're more interested in cooking food than reading about it, FTP to "gatekeeper.dec.com". In the directory "pub/recipes" you'll find dozens of recipes, from tofu balls to pizza dough, and margaritas to meat loaf. Also check out "mthvax.cs.miami.edu" in directory "/recipes".

Libraries: The computer's ability to hold vast amounts of data—and search through it quickly—makes research that once took hours take only seconds. Another benefit is that you no longer need to be where the information is—going to the library to search through a card catalog is a thing of the past.

Bibliographic information about materials in the Library of Congress is available by telnetting to 192.65.218.43 (dra.com.) Actually, it's only a subset of the complete Library of Congress holdings, but it's still quite vast and quite useful. (Searches for *MicroTimes*, Laurie Anderson, and rutabagas all provided more than enough information to start a research project in the right direction.) The program allows searches by title, author, subject, and other methods. The system provides quick searches and useful online help. The actual documents are not online, but once you have the call numbers of the materials you want, you can trot down to your local library to collect them.

MELVYL is the University of California online library system. It also serves California State University libraries. MELVYL holds over seven million unique book titles in all. In addition to access to the full MELVYL catalog and periodical listings, the system can connect you to ten other university libraries around the country.

Unfortunately, MELVYL does not provide Internet users all of the features accessible to UC students. For instance, indexes to recent journal articles are not available. To use MELVYL, telnet to 192.35.222.222 (melvyl.ucop.edu).

A plethora of reference information is on hand from INFO, the Rutgers University Pilot Campus-Wide Information System. Online materials include the Concise Oxford Dictionary, Oxford Thesaurus, two quotation references, the CIA world fact book, and various religious texts. Also online are hypertext electronic documents and other examples of the future of online retrieval. To use the service, telnet info.rutgers.edu (128.6.26.25) from the main menu, and select "library." The system also contains information probably useful only to those who attend Rutgers. Even though it is a "local" system for their use, the operators are kind enough to share their resources with the general public.

Also, check out CARL, at pac.carl.org (192.54.81.128). CARL provides access to two dozen other libraries' catalogs, as well. Unfortunately, a lot of the interesting information on CARL, like the online encyclopedia, isn't available to the general public.

Now, if you just want to look up a word, no problem. Ask Webster. Many systems have the Webster program all ready for you to use (type "webster" to see.) If not, a public Webster client will assist you. Type "telnet cs.indiana.edu 2627" (or 129.79.254.191 2627) to access the dictionary and spelling service.

Once you connect, the program won't prompt you for input. Type "SPELL" (be sure to use all capitals) followed by a word to verify the spelling of a word. If your word doesn't match anything in the dictionary, it will try to guess the correct spelling. The program also provides definitions to words: type "DEFINE" and your word to see the definitions. There are other commands as well, so type "HELP" to get a full set of instructions. Type "QUIT" to leave Webster.

For more information about finding catalogs online, download the file "library/internet.library" by FTP from ariel.unm.edu. This is a list of Internet-accessible catalogs and databases.

Misc.: Nuclear data is available by telnetting to 130.199.112.132 (Username: nndc). To receive daily stock updates by electronic mail, send an email request to martin.wong@eng.sun.com. ■

Figure: Example FTP Session

```
steer[3] ftp wuarchive.wustl.edu
Connected to wuarchive.wustl.edu.
220 wuarchive.wustl.edu FTP server (Fri Nov 20
10:29:15 CST 1992) ready.
Name: anonymous
331 Guest login ok, send your complete e-mail
address as password.
Password: waffle@steer.sdsu.edu
230-
230- This system may be used 24 hours a day,
7 days a week. The local
230- time is Fri Jan 8 23:09:04 1993.
230-
230- Please read the file README
230- It was last modified on Mon Mar 2 08:29:25
1992 - 311 days ago
230- Please read the file README.NFS
230- It was last modified on Thu Nov 12 12:50:58
1992 - 56 days ago
230 Guest login ok, access restrictions apply.
ftp> binary
200 Type set to I.
ftp> cd /mirrors/EFF/internet-info
250 CWD command successful
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for
file list.
ptrs
interest-groups.td.Z
usenet.qa.Z
usenet.newsgroups.Z
usenet.etiquette.Z
read.this.first.Z
privatized.nren.Z
lynch.Z
lita.nren.Z
Internetworking.Z
Internet.usenet.info.Z
Internet.q.Z
Internet.mailing.lists.Z
Internet.libraries.Z
hitchhikers.guide.Z
gore.bill.Z
ftp.sites.Z
cisler.nren.Z
bitnet.info.Z
etiquette.Z
226 Transfer complete.
338 bytes received in .1 seconds (3.3 Kbytes/s)
ftp> get hitchhikers.guide.Z
200 PORT command successful.
150 Opening BINARY mode data connection for
hitchhikers.guide.Z (23014 bytes).
226 Transfer complete.
local: hitchhikers.guide.Z remote:
hitchhikers.guide.Z
23014 bytes received in 1.6 seconds (14 Kbytes/
s)
ftp> quit
221 Goodbye.
steer[4] uncompress hitchhikers.guide.Z
steer[5] cat hitchhikers.guide
```


INTERNET SERVICES FREQUENTLY ASKED QUESTIONS AND ANSWERS

Version 1.4 - 2 September, 1993

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SECTION 3: I NEED INFORMATION ABOUT...

- 3.1: Where can I get Internet access in my area?
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SECTION 0: THE BASICS

*** 0.1: WHAT IS THE PURPOSE OF THIS DOCUMENT?

The Internet Services Frequently Asked Questions and Answers List (FAQ) is intended to help reduce the number of often asked questions that appear on the newsgroup "alt.internet.services". It helps users with questions by providing instant access to their answers; it helps other readers of the newsgroup, who will have to read fewer of the questions

they see over and over again; it helps everyone by (hopefully) reducing bandwidth.

This document should help you find answers to frequently asked questions. Usually, the answers are already available on the Net in one or more detailed documents. In these cases, this document will tell the reader where to find the information in question. Thus, when possible, this document will only point you to another document - that one may have the information you need, or it may point you somewhere else. (This may seem annoying at first, but offers multiple benefits. First, it reduces duplicated work. Second, it increases your chances of finding the most current, reliable information. Most importantly, it shows how to find the information you need rather than simply giving you answers. "Teach a man to fish...")

This FAQ is purely a volunteer effort. Although every effort has been made to insure that answers are as accurate as possible, no guarantee is implied or intended. The editor and contributors have developed this FAQ as a service to Usenet. We hope you find it useful.

While the editor tries to keep this document current, remember that the Internet is constantly changing, so don't be surprised if you happen across statements which are obsolete. If you do, please send corrections to the editor. Corrections, questions, and comments should be sent to Kevin Savetz at "savetz@rahul.net" (Internet) or "savetz" (America Online.) Please indicate what version of this document you are referring to.

This file is posted weekly to the newsgroup "alt.internet.services" (on the 5th, 12th, 19th and 26th of each month) and posted twice monthly to "news.answers" and "alt.answers" (on the 5th and 19th.) It is also available via anonymous FTP:
rtfm.mit.edu:/pub/usenet/news.answers/internet-services/faq

This means to use FTP to open a connection to "rtfm.mit.edu", login as "anonymous", and use your e-mail address as the password. Then, "cd" to the directory "/pub/usenet/news.answers/internet-services" and get the file "faq". This notation is used when appropriate throughout this document.

If you do not have FTP access, you can obtain it via email by sending an email message to "mail-server@rtfm.mit.edu" with a line in the body of the message reading "send usenet/news.answers/internet-services/faq". A program at that address will read your mail, process your request, and reply with mail containing the FAQ.

*** 0.2: WHAT IS ALT.INTERNET.SERVICES?

The following is excerpted from Scott McMahn's (mcmahn@cs.unca.edu) "Welcome to alt.internet.services" charter.

The newsgroup "alt.internet.services" was created to handle information about services available on the Internet, for people who have Internet accounts and want to explore beyond their local computers, to take advantage of the wealth of information and services on the net.

Services for discussion include:

- * things you can telnet to (weather, databases, library catalogs...)
- * things you can FTP (pictures, sounds, programs, data...)

* clients/servers (like MUDs, IRC, Archie...)

"alt.internet.services" isn't for:

- * discussion of utility programs like telnet, FTP, mail, and uuencode.
- * basic new user questions.
- * pleas for Internet access. (Use alt.internet.access.wanted for this.)

This is ***NOT*** alt.internet.access.wanted or alt.internet.new-users.

Before asking a question here:

- * Ask someone locally! Try the guy sitting next to you, your professor, or the system administrator. 9 times out of 10 you won't have to post your question.
- * Read the Usenet groups "news.newusers.questions" and "news.announce.newusers".
- * Look through your .newsrsrc file for a more appropriate group. Questions about mail can go to "comp.mail.misc". Questions about access can go to "alt.internet.access.wanted". And so on. alt.internet.services is ***not*** some kind of default group to go to if you can't find any others.
- * Ask yourself: Is this question about a service I can access through the Internet? If so, post.

*** 0.3: I'M NEW TO THE INTERNET. WHERE DO I START?

Welcome to the wonderful world of the Internet. Although this document may answer some of your basic questions, the Usenet newsgroup "alt.internet.services" isn't the place for questions like "How do I use telnet on my system?" or "How do I send electronic mail?" If you have access to the Usenet, read the newsgroups "news.newusers.questions" and "news.answers". If you have access to FTP, get copies of the introduction to the Internet documents mentioned at the end of this file. If you have access to users around you, ask them to show you the basics.

For a comprehensive overview of what the Internet is, how it works and the future of the Internet, read "FYI: What is the Internet?" (This file is available via anonymous FTP, and is listed in the final section of this document.)

*** 0.4: WHAT KIND OF INFORMATION IS ON THE INTERNET? (And, WHY ISN'T THERE AN ENCYCLOPEDIA ON THE INTERNET?)

The type of information you're likely to find on the Internet is free information, such as government documents, works with expired copyrights, works that are in the public domain, and works that authors are making available on an experimental basis to the Internet community. Conversely, some types of information you are not likely to find on the Internet, most notably, commercial works which are protected by copyright law.

For instance, there is no publicly-available Internet encyclopedia. There are indeed encyclopedias on the net, but they all are closed systems available only to students at a specific university, or employees at a certain company. The reason for this is about what you'd expect: the companies that make encyclopedias are in business to stay in business, and you don't stay in business by giving away your product. So, while the Internet does contain a vast array of Good Stuff, it can't always replace a trip to a decent library. If you can't find an online encyclopedia that's available to you, try the following:

Ask your own library to make sure they don't have one.

Use the encyclopedias on CompuServe, Prodigy, AOL, etc.
Use a (gasp!) regular encyclopedia, or one on CD-ROM.

Section 1: What is...

*** 1.1: WHAT IS TELNET?

Telnet is a program that allows you to login to another computer to run software there. Typically, you login either to access a "shell" command environment or some other utility, like a weather server or game. To telnet to a computer, you need to know it's name. This can either be in words, like "steer.sdsu.edu" or as a numeric address, like "130.191.1.11". Some services require you to connect to a specific "port" on the remote computer. Type the port number, if there is one, after the Internet address. (For example, "telnet nri.reston.va.us 185".) For more information, anonymous FTP to `ftp.sura.net:/pub/nic/network.service.guides`
`ftp.sura.net:/pub/nic/how.to.telnet.guide`

*** 1.2: WHAT IS ANONYMOUS FTP?

FTP stands for file transfer protocol. FTP allows you to copy files from a remote computer to your local host. Thousands of sites provide anonymous FTP service, allowing you to download everything from online books, to satellite pictures of the weather, to public-domain utilities and games for your personal computer.

Unless your computer is directly connected to the Internet (that is, if you are connected through an intermediary remote host) software for use on your home computer needs to be FTPed to your local host, then downloaded to your PC using Xmodem, Zmodem, Kermit or some other system -- a two-step process.)

There is an FTP primer (and lots of other good information) in the "alt.bbs.internet" FAQ, which is posted periodically on "alt.bbs.internet" and "news.answers".

The following files are available on the Net to teach the basics of FTP. If you don't know how to use FTP to receive them, try asking someone else at your site.

For more information, use anonymous FTP to get
`ftp.sura.net:/pub/nic/network.service.guides/how.to.ftp.guide`

The document "FYI: Searching for Treasure" (listed at the end of this file) lists some of the best FTP sites to find Macintosh, IBM, UNIX and other software. Sites maintaining anti-viral software are also covered.

*** 1.3: WHAT IS USENET?

The Usenet is a global bulletin board, of sorts, in which millions of people exchange public information on every conceivable topic. For more, FTP to:

`rtfm.mit.edu:/pub/usenet/news.answers/what-is-usenet/part1.Z`

The file is also posted regularly to the Usenet newsgroup "news.answers.newusers".

*** 1.4: WHAT IS FINGER?

Finger is a program that returns information about a registered user on a computer. Typing "finger" alone will show the users logged into the system you are using. "finger @host.domain.foo" may show you who's currently using some other computer. Certain computers have variations on finger support, where "finger ron" will show info on ron at your

site, and "finger ron@hal.gnu.ai.mit.edu" will show you all the Rons with accounts on a certain computer at MIT. Note that some finger programs don't take arguments, some will accept only a userid (the exact login name of a user,) and still others will search using a first or last name. If your system has manual pages installed, type "man finger" for more information. If your system has Internet access but not finger, there are several freely distributable versions, including GNU finger and BSD finger.

*** 1.5: WHAT IS IRC?

IRC is the Internet Relay Chat, a service where users can "talk" via typing to people around the world. See Scott Yanoff's "Internet Services" list for public IRC servers, or find out if your own system has the server installed. There are newsgroups specifically devoted to IRC, including:

alt.irc	Internet Relay Chat material.
alt.irc.bot	Discussion of creating IRC bots.
alt.irc.ircii	Discussion of the IRC II client program.
alt.irc.recovery	For those recovering from IRC addiction.
alt.irc.corruption	Is nowhere safe?
alt.irc.sleaze	Internet Relay Chat flamage.

For more information, anonymous FTP to:
cs.bu.edu:/irc/support/tutorial*

*** 1.6: WHAT IS ALEX/ARCHIE/GOPHER/HYTELNET/NETFIND/PROSPERO/VERONICA/WAIS/WHOIS/WWW/X.500?

These are all part of a new generation of network information resources. For complete information, check John December's "internet-tools" list, available via anonymous FTP to
ftp.rpi.edu:/pub/communications/internet-tools
That document will point you to detailed information about each of these services.

Scott Yanoff's "Internet Services List" list will tell you how to access these services. Most feature on-line help and information.

*** 1.7: WHAT IS MUD/MUSH/MOO/MUCK/DUM/MUSE (etc.)?

These are multi-user, text based, virtual reality games. According to the MUD FAQ: "A MUD (Multi-User Dungeon) is a computer program which users can log into and explore. Each user takes control of a computerized persona/avatar/incarnation/character. You can walk around, chat with other characters, explore dangerous monster-infested areas, solve puzzles, and even create your very own rooms, descriptions and items." There are an astounding number of variations on the MUD theme. Please see rec.games.mud for more information about them -- there are several very good FAQ postings there that detail MUDs, MUD clients and servers, and offer a complete, current MUD-list.

The most recent versions of the MUD FAQs are archived as:

ftp.math.okstate.edu:/pub/muds/misc/mud-faq/*
rtfm.mit.edu:/pub/usenet/alt.mud/*
[rec.games.mud]:_FAQ_#2_3:_MUD_Clients_and_Servers
[rec.games.mud]:_FAQ_#3_3:_RWHO_and_mudwho_
[rec.games.mud]:_FAQ_#1_3:_MUDs_and_MUDDing

A few of the newsgroups out there related to muds:

rec.games.mud.announce Informational articles about MUDs. (Moderated)

rec.games.mud.diku	All about DikuMuds.
rec.games.mud.lp	Discussions of LPMUD
rec.games.mud.misc	Various aspects of multiuser computer games.
rec.games.mud.tiny	Discussion of Tiny muds, IE MUSH, MUSE and MOO
alt.mud.bsx	BSX VR system.
alt.mud.german	For German-speaking MUD-er's.
rec.games.mud.admin	Administrative issues of multiuser dungeons.

SECTION 2: HOW DO I...?

*** 2.1: HOW DO I SEND ELECTRONIC MAIL FROM THE INTERNET TO ANOTHER NETWORK?

To learn the basics of e-mail on the Internet, FTP to:

<ftp.sura.net:/pub/nic/network.service.guides/how.to.email.guide>

In the best of worlds, our "global village" of electronic mail would be linked by one main street. Alas, it is actually composed of hundreds of small networks linked using "gateways." One main street is the Internet, but jutting off of it are dozens of side roads leading to other networks. It's always simplest to send mail to a recipient on the same online service as yourself - say, from your America Online account to another - but sometimes you may need to send mail to someone who doesn't have an account on the system you use. While it's usually possible to mail from one network to another, you need to know the right route to navigate. In order to send any mail, you need to know the online service your recipient uses, and her name (or username) on that service.

For a more complete listing of how to send mail from any random network to any other random network, read the "Inter-Network Mail Guide" edited by Scott Yanoff (formerly edited by John J. Chew.) It also tells how to mail from networks other than the Internet - which is beyond the scope of this document. You can fetch this guide by anonymous FTP in:

<csd4.csd.uwm.edu:/pub/internetnetwork-mail-guide>

AMERICA ONLINE: "user@aol.com" Use all lower case and remove spaces. For example, "savetz@aol.com". AOL splits long Internet e-mail messages into chunks under 27K. (In the past the America Online gateway software truncated incoming files at 27K, which put a damper on receiving long text files BinHexed programs.) Users of the DOS-based PC/AOL software are limited to a maximum mail size of 8Kb. For all AOL users, funky characters are replaced with spaces: use printable ASCII only.

APPLELINK: "user@applelink.apple.com"

AT&T MAIL: "user@attmail.com"

BITNET: "user@host.BITNET" (Note that the bitnet hostname is not necessarily the same as the Internet host name.) If this fails, try directing your mail through a gateway such as "cunyvm.cuny.edu", "pucc.princeton.edu", or "wuvmd.wustl.edu". The address would be as follows: "user&domain.BITNET@pucc.princeton.edu" (or cunyvm or wuvmd). This should help those with SMTP servers that are not quite up to date.

BIX: "user@bix.com"

BMUG: "First.Last@bmug.fidonet.org"

COMPUSERVE: "userid@compuserve.com". Use the numeric CompuServe identification number, but use a period instead of a comma to separate

the number sets. For example, to send mail to CompuServe user 17770,101 - mail to "177770.101@compuserve.com".

CONNECT: "user@dcjcon.das.net"

DELPHI: "user@delphi.com"

FIDONET: "firstname.lastname@point.node.net.zone.fidonet.org". To send mail to a FidoNet user, you not only need the name, but the exact FidoNet address s/he uses. FidoNet addresses are broken down into zones, net, nodes, and points. To send to John Doe, who uses point 1 of node 2, which is in net 3 of zone 4 - you would send your mail to "john.doe@p1.f2.n3.z4.fidonet.org".

GENIE: "user@genie.geis.com" where "user" is their mail address. If a user tells you their mail address is "xyz12345" or something similar, it isn't. It usually looks like "A.BEEBER42" where A is their first initial, BEEBER is their last name, and 42 is a number distinguishing them from all other A.BEEBER's. As of July 1, 1993, All GENie users may send and receive electronic mail.

INSTITUTE FOR GLOBAL COMMUNICATIONS (IGC, or "PEACENET"): "user@igc.org"

INTERNET: send mail to "user@domain", where user is the recipient's login name, and domain is the full name and location of the computer where s/he receives e-mail. Examples are "savetz@rahul.net" and "an017@cleveland.freenet.edu".

MCI MAIL: send your mail to "user@mcimail.com". "User" can be a numeric identification, or first and last names separated with an underline. (E.g. "10101@mcimail.com" or "john_doe@mcimail.com".)

PC LINK: "user@aol.com". Incoming mail is limited to 27K. (There is no pmlink.com domain. All mail to the America Online, Inc. owned systems goes to aol.com.)

PRODIGY: Prodigy has been promising network mail for months, but hasn't delivered it yet. So currently, Prodigy users are cut off from mail to the outside world. Perhaps by the end of the year, Prodigy users will be able to send and receive mail to and from other networks. [This should start working any time now, stay tuned.]

QLINK: Q-Link, a Commodore 64/128-based service offered by America Online, Inc., is not on the Internet for technical reasons.

WELL: "user@well.sf.ca.us"

*** 2.2: HOW DO I ACCESS OTHER SYSTEMS FROM THE INTERNET?

AMERICA ONLINE: You can't use AOL from the Internet due to the special graphics software.

BIX: telnet "x25.bix.com". At the "username" prompt, enter "bix".

COMPUSERVE: CompuServe is accessible from the Internet through the Merit system, but it is quite expensive. CompuServe does not distinguish logins from MERIT from other SprintNet logins. Merit is a service local to Michigan residents so all connections will be Eastern Standard Time regardless of where in the world you access Merit from. Pricing for

using Merit: From 7PM - 8AM EST: \$1.70/hour. From 8AM - 7PM EST: \$11.70/hour. These prices are in addition to your normal CompuServe prices. The billing is all be handled by CompuServe. For further info about this service, contact : CompuServe (1-800-848-8199), SprintNet (1-800-877-5045), or Merit, Inc.: (1-313-764-9430).

DELPHI: telnet delphi.com

DIALOG: telnet dialog.com

GENIE: telnet hermes.merit.edu, at the "Which host?" prompt, enter "sprintnet-313171". SprintNet communication surcharges will apply. This is not guaranteed to work for file transfers or any other 8-bit transfers due to the nature of the telnet protocol. This is therefore not supported by GENIE.

INSTITUTE FOR GLOBAL COMMUNICATION (IGC, or "PEACENET"): telnet igc.org

MCI MAIL: Cannot be accessed via the Internet. The only way users can currently access MCI mail is by dialing in via SprintNet/Tymnet or MCI Mail's own numbers. A tech support rep said that letting people check their MCI mail accounts from Internet isn't a high priority for now.

NEXIS/LEXIS: telnet lexis.meaddata.com or telnet 192.73.216.20 or telnet 192.73.216.21. terminal type = .vt100a If characters do not echo back, set your terminal to "local" echo or "half duplex." You can also connect through Merit.

PC LINK: Can't be accessed due to the special graphics software.

PRODIGY: Can't be accessed due to the special graphics software.

QLINK: Q-Link, a Commodore 64/128-based service offered by America Online, Inc., is not on the Internet for technical reasons.

WELL: telnet well.sf.ca.us

*** 2.3: HOW DO I CONTACT A SERVICE PROVIDER?

AMERICA ONLINE: (800) 827-6364 voice
BIX: (800) 695-4882 modem, (800) 695-4775 voice.
CONNECT: (408) 973-0110 voice
COMPUSERVE: (800) 848-8990 voice
DELPHI: (800) 544-4005 voice
DIALOG: (800) 334-2564 voice
DOW JONES NEWS/RETRIEVAL: (800) 522-3567 voice
GENIE: (800) 638-9636 voice
INSTITUTE FOR GLOCAL COMMUNICATIONS: (415) 923-0220 voice
NEXIS/LEXIS: (800) 227-9597 voice. Government Customers: 513-865-7223
MCI MAIL: (800) 444-6245 voice
PC-LINK (800) 827-8532 voice.
PRODIGY: New account information (800) 766-3449 voice
 Membership services (800) 759-8000 voice
WELL: (415) 332-4335 voice. E-mail: support@well.sf.ca.us

*** 2.4: HOW DO I FIND OUT SOMEONE'S E-MAIL ADDRESS?

With so many computer systems and users in the world, it is impossible to keep a complete "white pages" of the Internet. The problem is compounded because people come and go from the net all the time.

(Students are notorious for this.) Storing and updating that much information would be an impossible, daunting task.

But, it's not impossible to find people on the net. Programs exist that, given some amount of information about your associate, can help you track down his or her e-mail address. These tools include Netfind, X.500, rtfm's usenet-addresses search, and WHOIS. The more information you know about your associate - name, place of business or school, and so on - the better your chances are.

For a very complete answer to this question, read: "FAQ: How to find people's E-mail addresses", available from mail-server@rtfm.mit.edu by sending "send usenet/news.answers/finding-addresses". This document is posted regularly to the Usenet group "news.answers".

There is another long document specifically for finding college students' e-mail addresses. It is also posted to "news.answers". It's available by anonymous FTP on "a.gp.cs.cmu.edub" as: [This is no longer a valid site. Stand by for updated info...]

/afs/cs.cmu.edu/user/mkant/Public/Email/college-email-1.text

/afs/cs.cmu.edu/user/mkant/Public/Email/college-email-2.text

/afs/cs.cmu.edu/user/mkant/Public/Email/college-email-3.text

*** 2.5: HOW DO I GET A NAME RESOLVED?

There should be a name resolver on your system. On UNIX, look for a program called "nslookup". Failing that, send an electronic message to "resolve@cs.widener.edu". In the body of the message, include a line like "site foo.bar.baz", where foo.bar.baz is the name of the site in question. You'll receive a mail message with the IP (Internet Protocol) address for the site.

*** 2.6: HOW DO I SEND E-MAIL TO THE WHITE HOUSE?

The official Party Line: "The White House e-mail system is under construction. This is a new project and suffers from all of the problems common to a startup operation. The Communications office is currently working on defining what this system will do, as well as trying to come up with equipment and staffing to make sure that it works. E-mail messages are currently being printed out and responses are being sent out via US Mail.

"Nobody wants this new venture to work more than the staff that has devoted so many hours to getting it up and running. But much time and effort will be required before the system is truly interactive. In the mean time, they will need a little patience from the electronic community. If you send a message to the White House, please include a US Post office address for replies."

On the Internet, send to:
president@whitehouse.gov or vice.president@whitehouse.gov

*** 2.7: HOW DO I GET STOCK MARKET INFORMATION?

Scott Yanoff's "Internet Services" list tells you how, but this question comes up so often its worth mentioning here. If you use a terminal with VT100, ANSI, or some other full-screen terminal emulation, "telnet rahul.net" and log on as "guest". Request the full-screen guest menu; request system information; request the market report. Note that this system, a2i Communications, sells full UNIX accounts with Internet

access - the stock service is a feature for guests and paying users, and isn't guaranteed to be reliable.

People keep asking where to find historical stock information. As far as I know, this isn't available on the Net.

*** 2.8: HOW DO I ACCESS THE LIBRARY OF CONGRESS?

(Thanks to Kathryn D. Ellis (kell@seq1.loc.gov) for the following info.)

Library of Congress Online Search: Telnet to "locis.loc.gov" (140.147.254.3). This will connect you to LOCIS (Library Of Congress Information System). You will see a menu for the Library of Congress Catalog Files, Federal Legislation, Copyright Information, Foreign Law, Braille and Audio Files, and a file of selected Organizations. This system is available Monday through Friday, 6:30 a.m. to 9:30 p.m.; Saturday, 8:00 a.m. to 5:00 p.m.; and Sunday, 1:00 p.m. to 5:00 p.m. (all times USA, Eastern Time). Searching manuals are available by anonymous FTP and for sale. LOCIS accepts both 3270 and VT100 modes, but 3270 works better.

Library of Congress MARVEL: Telnet to "marvel.loc.gov" (140.147.2.15), login as "marvel", or point your gopher client to "marvel.loc.gov", port 70. LC MARVEL is a gopher-based campus wide information system that presents information about the Library of Congress such as facilities and services, reading rooms, copyright, services to libraries and publishers, etc., as well as many electronic resources accessible through the Internet.

Library of Congress Anonymous FTP site: FTP to "seq1.loc.gov" (140.147.3.12), login as "anonymous", send your email address as a password, "cd /pub" to get to the public directory. From the public directory, you can access several subdirectories such as online exhibits, information about the Library of Congress, information from the Federal Library and Information Center Committee (FLICC), etc.

SECTION 3: I NEED INFORMATION ABOUT...

*** 3.1: WHERE CAN I GET INTERNET ACCESS IN MY AREA?

Check out PDIAL, a list of public access service providers offering dialup access to Internet connections. PDIAL lists both free and pay services all around the world. The PDIAL list is posted semi-regularly to alt.internet.access.wanted, alt.bbs.lists, ba.internet, and news.answers.

To receive PDIAL via e-mail, send mail with a subject line of "Send PDIAL" to "info-deli-server@netcom.com". To receive future editions as they are published, send email with the subject "Subscribe PDIAL" to the same address. The most recent PDIAL is also available by sending mail with a message body of "send usenet/news.answers/pdial" to "mail-server@rtfm.mit.edu". To get PDIAL via FTP:

ftp.netcom.com:/pub/info-deli/public-access/pdial
rtfm.mit.edu:/pub/usenet/alt.internet.access.wanted/P_D_I_A_L_(P)

For more information about service providers and getting on the Internet, read "FYI: Searching for Treasure" (FTP info at the end of this document.)

"Where can I get <whatever> online?" - chances are, it's in there.
Finger "yanoff@csd4.csd.uwm.edu" to find ways to receive this list.

"Surfing the Internet" is available as:
nysernet.org:/pub/guides/surfing.2.0.2.txt

"Zen and the Art of Internet" is the first edition of Kehoe's Book,
detailed in the final section. The book is much longer, updated and
improved over this online version. It is available as:
world.std.com:/obi/Internet/zen-1.0/zen-1.0.txt.Z
ftp.uu.net:/doc/internet/zen-1.0.txt.Z

If you have Usenet access, read some of the many newsgroups for new
users and frequently asked questions: "news.answers", "comp.answers" and
"news.newusers.questions".

*** 3.5: ARE THERE ANY MAGAZINES ABOUT THE INTERNET?

Sure. (All prices in US dollars.)

"Internet Business Journal" Strangelove Press. E-mail:
72302.3062@compuserve.com or phone: (613) 747-6106. \$149 (\$179 Canadian)
for a one year (6 issue plus six supplements) subscription; \$75 (\$89
Canadian) for educational institutions and small businesses.

"Internet World" (Previously Electronic Networking: Research,
Applications, and Policy.) Meckler Corp. E-mail: meckler@jvnc.net.
Phone: (800)-MECKLER.

"Matrix News" (Matrix Information and Directory Services.) Published in
online and paper editions. Online edition is \$25 for 12 monthly issues
(\$15 for students.) E-mail: mids@tic.com

"Online Access" (Chicago Fine Print.) Subscription is \$19.80 for 8
issues. E-mail: 70324.343@compuserve.com

*** 3.6: WHAT'S A GOOD BOOK TO READ FOR MORE INFORMATION ABOUT THE
INTERNET?

(All prices in U.S. dollars.)

"Crossing the Internet Threshold: an Instructional Handbook" by Roy
Tennant, John Ober and Anne Lipow. Library Solutions Press, 1993. (510)
841-2636. An instructional package for librarians teaching Internet
basics. \$45. FTP for info:
simsc.si.edu:/networks/crossing.ad

"Exploring the Internet: a Technical Travelogue" by Carl Malamud.
Prentice-Hall Publishers. (515) 284-6751.

"The Internet Companion, A Beginner's Guide To Global Networking" by
Tracy LaQuey with Jeanne C. Ryer (Addison-Wesley Publishing.) The
Companion includes a detailed history of the Internet, a discussion on
"netiquette" (network etiquette), and how to find resources on the net.
Useful for the computer-literate Internet novice. ISBN: 0-201-62224-6.
1993. \$10.95.

"Internet: Getting Started." Authors: Marine, Kirkpatrick, Neou, Ward.
SRI Internet Information Services, PTR Prentice Hall. Published by PTR
Prentice Hall, New Jersey. Explains how to join the Internet, the
various types of Internet access, and procedures for obtaining a unique
IP address and domain name. An extensive list of Internet access

ftp.rpi.edu:/pub/communications/internet.cmc

"The Internet Companion" a beginner's guide to the net, is available by FTP. This is part 1 of the Tracy LaQuey book mentioned in the previous section.

world.std.com:/OBS/The.Internet.Companion

"Internet Resource Guide" is an excellent guide to major resources available on the network. Includes chapters on Computational Resources, Library Catalogs, Archives, White Pages, Networks, Network Information Centers, and Miscellaneous.

nnsc.nsf.net:/resource-guide/resource-guide.txt.tar.Z

nnsc.nsf.net:/resource-guide/resource-guide.ps.tar.Z

"Internet Services Frequently Asked Questions and Answers". That's the file you're looking at now. For the most recent version, FTP to: rtfm.mit.edu:/pub/usenet/news.answers/internet-services/faq or send an email message to "mail-server@rtfm.mit.edu" with a line in the body of the message reading "send usenet/news.answers/internet-services/faq".

"Internet-tools list", by John December, contains information about a variety of network tools and information resources (such as Archie, Gopher, Netfind, WWW and so on.) It is available at: ftp.rpi.edu:/pub/communications/internet-tools

"Inter-Network Mail Guide", contains a possibly-complete listing of how to send mail from any random network to any other random network. It also tells how to mail from networks other than the Internet - which is beyond the scope of this document. You can fetch this guide by anonymous FTP in:

csd4.csd.uwm.edu:/pub/internetnetwork-mail-guide

"List of Lists". For a list of some of the currently available electronic mail mailing lists, FTP to:

nisc.sri.com:/netinfo/interest-groups

To be notified of future additions to the list, send mail to interest-groups-request@nisc.sri.com.

"NIXPUB" is available via anonymous FTP as:

vfl.paramax.com:/pub/pubnet/nixpub.long

vfl.paramax.com:/pub/pubnet/nixpub.short

Or, you can receive it via e-mail. Send mail to

"nixpub@access.digex.com" (subject/message body unimportant.)

"PDIAL", a list of public access service providers offering dialup access to Internet connections. PDIAL is posted semi-regularly to alt.internet.access.wanted, alt.bbs.lists, and news.answers. To receive PDIAL via e-mail, send mail with a subject line of "Send PDIAL" to "info-deli-server@netcom.com". To get it, FTP to either:

ftp.netcom.com:/pub/info-deli/public-access/pdial

rtfm.mit.edu:/pub/usenet/alt.internet.access.wanted/P_D_I_A_L_(P)

"Special Internet Connections List", edited by Scott Yanoff, is updated monthly and is posted periodically to alt.internet.services and elsewhere. It includes everything from where to FTP pictures from space, how to find agricultural information, public UNIX, online books and dictionaries, you name it. Check this list before posting the question

documents for new users, comprehensive Internet guides, as well as specialized and technical information (for instance, Internet growth studies, maps, and statistics.) It also lists electronic journals and tons of other good things. (FTP info at the end of this document.)

Also, check out the Internet Resource Guide: this is an excellent guide to major resources available on the network. Includes chapters on Computational Resources, Library Catalogs, Archives, White Pages, Networks, Network Information Centers, and Miscellaneous. (FTP info at the end of this document.)

*** 3.4: HOW DO I GET INFORMATION ABOUT THE INTERNET ONLINE?

Once you have an account, several good texts are available via FTP:

"FYI: New Internet User Questions" (RFC-1325) is FTPable as:
nic.merit.edu:/documents/fyi/fyi_04.txt

"FYI: Experienced Internet User Questions" (RFC-1207) is FTPable as:
nic.merit.edu:/documents/fyi/fyi_07.txt
This file is dated February 1991, and some of the information may be out of date. Many of the Q&As are of a technical nature. Covers the Domain Name System, SLIP & PPP, network management, routing and the like.

"FYI: Searching for Treasure" is FTPable as:
nic.merit.edu:/documents/fyi/fyi_10.txt
This document (dated January 1993) presents some of the "gold nuggets" of information and file repositories on the network. Very useful.

"FYI: Internet Users' Glossary" (RFC-1392) is FTPable as:
nic.merit.edu:/documents/fyi/fyi_18.txt
This is a comprehensive glossary concentrating mostly on terms specific to the Internet.

"FYI: What is the Internet?" is FTPable as:
nic.merit.edu:/documents/fyi/fyi_20.txt
This comprehensive paper covers the Internet's definition, history, administration, protocols, financing, and current issues such as growth, commercialization, and privatization. (May 1993.)

"The Hitchhiker's Guide to the Internet" (RFC-1118) will interest users who are more into the technical bits of the Internet. This document, also written by Ed Krol, explains how Internet addresses work and discusses issues such as trust and carrying capacity of the Internet. It is pretty much out of date, but people keep asking for it. The "Guide," as well as other useful texts for new users, is available at
wuarchive.wustl.edu:/mirrors/EFF/internet-info/*

"Internet Basics" is available by FTP as:
nnsc.nsf.net:/nsfnet/internet-basics.eric-digest

"Internet-cmc list", by John December, is a pointer to a slew of resources. Its purpose is to list pointers to information describing the Internet, computer networks, and issues related to computer-mediated communication. It points to Internet documents for new users, comprehensive Internet guides, as well as specialized and technical information (for instance, Internet growth studies, maps, and statistics.) It also lists electronic journals and tons of other good things. It is available via anonymous FTP as:

Another list of service providers, and tips on getting Internet access, is provided in the "alt.bbs.internet" FAQ, available via FTP as
rtfm.mit.edu:/pub/usenet/news.answers/inet-bbs-faq.Z

Access provider information from Ed Krol's book "The Whole Internet" (detailed in the final section of this document) is available via anonymous FTP as
ftp.nisc.sri.com:/netinfo/internet-access-providers-us.txt
ftp.nisc.sri.com:/netinfo/internet-access-providers-non-us.txt

If you are a college student or faculty, check with your campus computer center to learn about the online facilities available to you. Many schools offer free accounts to students and staff.

Next, turn to the Usenet community for assistance. Find out if there is a local newsgroup for your area or state. For instance, Columbus, Ohio users can check on the "oh.general" and "cmh.general" newsgroups. Many other areas have regional newsgroups. Ask the locals questions about the area - who better to know the answers?

If all else fails, post your plea on the Usenet newsgroup "alt.internet.access.wanted". Note that such requests aren't looked kindly upon if posted elsewhere.

*** 3.2: I NEED A BBS (ON THE INTERNET OR IN MY AREA) !
This is covered extensively in the "alt.bbs.internet" FAQ, available on the Usenet group "alt.bbs.internet" or via FTP as
rtfm.mit.edu:/pub/usenet/news.answers/inet-bbs-faq.Z

Also look for information on the Usenet newsgroups "alt.internet.access.wanted" and "alt.internet.services". Get the PDIAL list, mentioned at the end of this document.

Also available is NIXPUB, a listing of over 100 free and pay-for-play accessible systems. It is posted regularly to the Usenet newsgroups "comp.misc", "comp.bbs.misc", and "alt.bbs". Retrieval information near the end of this document.

Also, for BBS information for your area code or specific interest, FTP to:
wuarchive.wustl.edu:/mirrors/msdos/bbslists

*** 3.3: IS THERE A LIST OF ALL INTERNET SERVICES?
No. There are just too many computers and too many services for anyone to accurately maintain a complete list. However, Scott Yanoff edits a great list of Internet services: the "Special Internet Connections List" is updated biweekly and is posted periodically to alt.internet.services and elsewhere. His list is as comprehensive as any list could ever be. It includes everything from where to FTP pictures from space, how to find agricultural information, public UNIX, online books and dictionaries, you name it. Check this list before posting the question "Where can I get <whatever> online?" - chances are, it's in there. Finger "yanoff@csd4.csd.uwm.edu" to find ways to receive this list.

There's also John December's "internet-cmc" list, which serves as a pointer to a slew of resources. Its purpose is to list pointers to information describing the Internet, computer networks, and issues related to computer-mediated communication. It points to Internet

providers of all types is provided, including access outside of the United States. The guide explains many concepts essential to the Internet, such as the Domain Name System, IP addressing, protocols, and electronic mail. ISBN: 0-13-327933-2. 1993. Paperback, 360 pages. \$28.00.

"The Internet Guide for New Users," by Daniel P. Dern. Along with the obligatory topics such as telnet, FTP, and Archie, the book suggests how to get an Internet account and teaches enough UNIX to survive on the net.

"Internet: Mailing Lists 1993 Edition." Franklin F. Kuo, Series Editor. SRI Internet Information Services. Published by PTR Prentice Hall, New Jersey. ISBN: 0-13-327941-3. Copyright 1993. Paperback, 356 pages. (Note that a current "list of lists" is also available online, both via Usenet and FTP. See the final section.)

"The Internet Passport: NorthWestNet's Guide to Our World Online, 4th ed.". This is published by NorthWestNet and the Northwest Academic Computing Consortium, Inc. It is 516 pages and covers everything from net etiquette to supercomputers; very comprehensive. It costs \$39.95 but schools and not-for-profit organizations can buy it for \$19.95 plus shipping. NorthWestNet, 15400 SE 30th Place, Suite 202, Bellevue, WA 98007. (206) 562-3000. E-mail for info: "passport@nwnet.net".

"Internet Primer for Information Professionals: A Basic Guide to Internet Networking Technology". By Elizabeth Lang and Craig Summerhill, Meckler Publishing. ISBN: 0-88736-831-X. 1993. \$37.50.

"Internet System Handbook" by Danial Lynch and Marshall Rose. Addison-Wesley Publishing, 1993. \$54.95.

"Using UUCP and Usenet" by Grade Todino and Dale Dougherty. 194 pages. O'Reilly & Associates. 1991.

"The Whole Internet User's Guide and Catalog" by Ed Krol (published by O'Reilly & Associates.) This book covers the basic utilities used to access the network and then guides users through the Internet's "databases of databases" to access the millions of files and thousands of archives available. It includes a resource index that covers a broad selection of approximately 300 important resources available on the Internet. ISBN: 1-56592-025-2. 1992. 400 pages. \$24.95.

"Zen & the Art of Internet" by Brendan Kehoe. Published by Prentice Hall. This guide should give you a reference to consult if you're curious about what can be done with the Internet. It also presents the fundamental topics that are all too often assumed and considered trivial by many network users. It covers the basic utilities and information reaching other networks. An earlier, much less comprehensive version is available via FTP; see previous section. ISBN: 0-13-010778-6. 112 pages. 1993. \$22.00.

End of document

* SPECIAL INTERNET CONNECTIONS: Last Update: 9/2/93 *
* Compiled By: Scott Yanoff - yanoff@csd4.csd.uwm.edu *
* A + by an entry designates new entries/changes since last update *

* Finger yanoff@csd4.csd.uwm.edu to find ways to receive this list!

* Need Internet access or know someone who does? O'Reilly and Associates new book, Connecting to the Internet, explains all the options.
(ISBN: 1-56592-061-9) Also out is the 3rd edition of Learning the UNIX Operating System (ISBN: 1-56592-060-0). Be sure to get your copy of both these quality publications!

-Agricultural Info., telnet psupen.psu.edu or telnet 128.118.36.5
Family Issues, PENpages (Login: Enter your two-letter state abbrev.)
Food & Nutrition, telnet caticsf.csfresno.edu or telnet 129.8.100.15
and Environment CSU Fresno ATI-NET (Login: super)
telnet eureka.clemson.edu or telnet 130.127.8.3
CUFAN (Clemson U Forestry & Ag. Net.) (Login: PUBLIC)
telnet empire.cce.cornell.edu or telnet 132.236.89.2
CENET (Cornell Extension NETwork) (Login: guest)
ftp ftp.sura.net (get file pub/nic/agricultural.list,
it contains agricultural email lists & services.)
offers: Agricultural info (livestock reports, current market prices, etc.)

-Almanac mail servers mail almanac@esusda.gov or mail almanac@ecn.purdue.edu
mail almanac@oes.orst.edu or mail almanac@ces.ncsu.edu
mail almanac@silo.ucdavis.edu
mail almanac@joe.uwex.edu or almanac@wisplan.uwex.edu
offers: USDA market news, articles about use of computer in agricultural
science, and Extension Computing Technology Newsletters.
In body of letter: send guide Other cmds: send catalog, send help haylist

-Almanac of Events finger copi@oddjob.uchicago.edu
offers: Daily list of events and b-days in history, and baseball schedule.

-Am. Philos. Assoc. telnet eis.calstate.edu or telnet 130.150.102.33
offers: BBS for philosophers. (Login: apa)

-Amateur Radio mail info@arrl.org (Also see Ham Radio below)
offers: Ascii files about Amateur Radio and electronics.
In Body of letter: help, info, send <filename> or quit (ie send prospect)

-Archeological Dbase telnet cast.uark.edu or telnet 130.184.71.44
offers: National Arch. Database information management system. (Login: nadb)

*AVIATION-----
-Aviation Gopher gopher av.eecs.nwu.edu
offers: Acts as a repository for things on rec.aviation. (pics, stories...)

-DUATS telnet duat.gtefsd.com or telnet 131.131.7.105
telnet duats.gtefsd.com or telnet 131.131.7.106
offers: Aviation weather, flight planning. (Login: <last name>)
The first address is for certified pilots, the second for uncertified.

-CARL telnet pac.carl.org or 192.54.81.128
offers: Online database, book reviews, magazine fax delivery service.

-Consumer Access Serv. telnet columbia.ilc.com or telnet 38.145.77.221
offers: Search for/buy CDs, software, and video tapes online! (Login: cas)

-Dartmouth Library telnet library.dartmouth.edu or 129.170.16.11
offers: Divine Comedy and reviews. (connect dante)
Read/Find passages in the King James Bible (select file bible)
Read/Find passages in Shakespeare's plays (select file s plays)
Read/Find passages in Shakespeare's sonnets (select file s sonnets)

-DataBase Via Finger finger help@dir.su.oz.au
offers: Query databases, find newsgroups, access archie, etc., via finger.

+ECHO telnet echo.lu or telnet 158.64.1.36
offers: European Commission Host Organization, free databases! (Login: echo)

*EDUCATION-----

-FEDIX/MOLIS/HERO telnet fedix.fie.com or telnet 192.111.228.33
offers: info. on scholarships, minority assistance, etc.

-Empire Schoolhouse telnet nysernet.org or telnet 192.77.173.2
offers: Provides K-12 resources, discussion groups, etc. (Login: empire)

-MicromUSE telnet michael.ai.mit.edu or telnet 18.43.0.177
MarimUSE telnet pc2.pc.maricopa.edu 4228 or 140.198.16.12 4228
offers: Educational Multi-User Simulated Environments. (Login: guest).

-Nat'l Education BBS telnet nebbs.nersc.gov or telnet 128.55.128.90
offers: A limited-access system for NESP educators. (Login: guest)

-Newton telnet newton.dep.anl.gov or telnet 130.202.92.50
offers: BBS for those teaching/studying sci., CS, math. (Login: cocotext)

+FedWorld Gateway telnet fedworld.doc.gov or telnet 192.239.92.201
offers: Access to lots of gov't databases, files, libraries, etc.

-Fileserver via Email mail laff@sal.cs.uiuc.edu
offers: Humor, ASCII, etc. At begining of line in message: Filesend: help

-Finger through Telnet telnet site 79 (example: telnet csd4.csd.uwm.edu 79)
"site" is the place you are fingering. Once connected, type the username.

*FTP-----

-Archie telnet archie.au or 139.130.4.6 (Aussie)

+telnet archie.edvz.uni-linz.ac.at or 140.78.3.8

telnet archie.univie.ac.at or 131.130.1.23 (Austria)

telnet archie.funet.fi or 128.214.6.102 (Finland)

telnet archie.th-darmstadt.de or 130.83.128.111 (Ger.)

telnet archie.kuis.kyoto-u.ac.jp or 130.54.20.1 (Japan)

telnet archie.sogang.ac.kr or 163.239.1.11 (Korea)

telnet archie.nz or 130.195.9.4 (New Zealand)

telnet archie.luth.se or telnet 130.240.18.4 (Sweden)

telnet archie.ncu.edu.tw or telnet 140.115.19.24 (TWN)

telnet archie.doc.ic.ac.uk or 146.169.11.3 (UK/Ireland)

telnet archie.sura.net or 128.167.254.194 (USA [MD])

telnet archie.unl.edu or 129.93.1.14 (USA [NE])

telnet archie.ans.net or 147.225.1.10 (USA [NY])

telnet archie.rutgers.edu or 128.6.18.15 (USA [NJ])

telnet ds.internic.net or 198.49.45.10 (AT&T)
offers: Searches all ftp sites for any program you want. (Login: archie)

-Archie Mail Servers mail archie@<INSERT ONE OF ABOVE ADDRESSES HERE>
Subject: help Offers: alternative Archie access to those w/o ftp or telnet.

-FTP via EMail mail ftpmail@decwrl.dec.com
Subject: (hit return) Body-of-letter: help (return) quit
mail ftpmail@grasp.insa-lyon.fr
Body-of-letter: help. Please, European users only.
mail bitftp@pucc.princeton.edu
mail BITFTP@DEARN or to BITFTP@vm.gmd.de (Europe only)
Body-of-letter: help or ftplist for a list of anon. ftp sites.

-FTP Sites/Archives ftp ocf.berkeley.edu or ftp 128.32.184.254
offers: cd /pub/Library for great lib. of docs, bible, lyrics, etc.
ftp wuarchive.wustl.edu or ftp sunset.cse.nau.edu
offers: Gifs, Sights, & Sounds! ftp sounds.sdsu.edu for the sounds archive
ftp ftp.uu.net
offers: You name it, it's here!
ftp archive.umich.edu or sumex-aim.stanford.edu
offers: Software for MS-Dos computers, Mac, Amiga, Apple2, Apollo...
ftp bak.oakland.edu
offers: A huge software archive for PCs and UNIX.
ftp ftp.sura.net
offers: How-to's about internet (email, ftp, telnet, etc.) in /pub/nic
ftp quartz.rutgers.edu
offers: All the text/humor files you'd want (tv, sex..) cd pub/humor

-FTP via Telnet telnet grind.isca.uiowa.edu or telnet 128.255.19.233
offers: Access UIowa's huge FTP site via telnet! (Login: iscabbs)

*GAMES/RECREATIONAL/FUN-----

-Backgammon Servers telnet ouzo.rog.rwth-aachen.de 8765
offers: Play Backgammon! (Login: guest) Also telnet 134.130.130.46 8765

-Bolo Tracker telnet gwis.circ.gwu.edu 1234 or 128.164.140.37 1234
offers: Location of current bolo games.

-Chat Clients ftp ftp.santafe.edu (4M Chat Service: /pub/SIG/4m)
ftp csd4.csd.uwm.edu (ICB Chat Service: cd pub/tjk)
ftp cs.bu.edu (IRC Chat Service: cd /irc/clients)
Get chat client program from ftp sites, compile program (make) and execute.

-Chat Service telnet ns.speedway.net 5001 or 198.51.248.20 5001
offers: Tele-Chat online chat service.

-Chess Server telnet 18.52.0.70 5000 or 130.225.16.162 5000 (EUR.)
offers: Play/watch real-time chess w/ human opponents. Type 'help' for help

-Cookie Server telnet astro.temple.edu 12345 or telnet 129.32.1.100
telnet argo.temple.edu 12345 or telnet 129.32.32.102
offers: Funny quote or saying everytime you telnet there.

?Cyber-Sleaze Report finger curryco@panix.com (to be moving to a new site)
offers: Daily reports on entertainers and such.

-Diplomacy mail judge@morrolan.eff.org or judge@dipvax.dsto.gov.au
 mail judge@shrike.und.ac.za or judge@u.washington.edu
offers: Play the Avalon Hill game Diplomacy via email. Body-of-letter: help
Note: No new games are forming on the u.washington Judge, but substitute
 players are still needed.

-Fingers for Fun finger coke@cmu.edu also finger drink@drink.csh.rit.edu
 finger info or graph@drink.csh.rit.edu
offers: Status of drink and candy machines for fun.
 finger franklin@ug.cs.dal.ca
offers: Random Star Trek quotes.

-GO Server telnet hellspark.wharton.upenn.edu 6969 or 128.91.11.53
 ?telnet ftp.pasteur.fr 6969 or 157.99.64.2 6969
 ?telnet bsdserver.ucsf.edu 6969 or 128.218.30.183 6969
offers: Join others and play a game of GO. (Login/Password: choose your own)

-IRC telnet server telnet wbrt.wb.psu.edu or 146.186.78.131
 telnet irc.demon.co.uk or 158.152.1.74
 +telnet sci.dixie.edu 6668 or telnet 144.38.16.2 6668
offers: Internet Relay Chat via telnet. (Login: irc) Also see CHAT above

-Scrabble telnet phoenix.aps.muohio.edu 7777 / 134.53.3.230 7777
offers: The popular Milton Bradley board game.

?Trade Wars telnet harmony.cern.ch 2002 or 128.141.237.19 2002
offers: Play the online multiplayer game on Trade Wars World BBS.

*GEOPHYSICAL/GEOGRAPHICAL/GEOLOGICAL-----

-Earthquake Info. finger quake@geophys.washington.edu or 128.95.16.50
 telnet geophys.washington.edu (Login/password: quake)
offers: Recent quake info (location, time, magnitude, etc.)

-Geographic Server telnet martini.eecs.umich.edu 3000 or 141.212.99.9 3000
offers: Info by city or area code (Population, Lat./Long., Elevation, etc.).

-Global Land Info Sys telnet glis.cr.usgs.gov or telnet 152.61.192.54
offers: Land use maps of U.S., graphs/data of geological info (Login: guest)

-Gopher telnet consultant.micro.umn.edu or telnet 134.84.132.4
 telnet seymour.md.gov or telnet 128.8.10.46
 telnet gopher.msu.edu or telnet 35.8.2.61
 telnet twosocks.ces.ncsu.edu or telnet 152.1.45.21
 telnet cat.ohiolink.edu or telnet 130.108.120.25
 telnet ENVIROLINK.hss.cmu.edu (Password: envirolink)
 telnet wsuaix.csc.wsu.edu / 134.121.1.40 (Logn: wsuinfo)
 telnet arx.adp.wisc.edu (Login: wiscinfo)
 telnet scilibx.ucsc.edu or 128.114.143.4 (INFOSLUG)
 telnet infopath.ucsd.edu (Login: infopath)
 telnet sunsite.unc.edu or telnet 152.2.22.81
 telnet uxl.cso.uiuc.edu or telnet 128.174.5.59
 telnet panda.uiowa.edu or telnet 128.255.40.201
 +telnet inform.umd.edu or telnet 128.8.10.29
 telnet grits.valdosta.peachnet.edu or 131.144.8.206
 telnet gopher.virginia.edu / 128.143.22.36 (Login: gwis)
 telnet ecosys.drdr.virginia.edu or 128.143.86.233

telnet gopher.ORA.com or telnet 140.186.65.25
 telnet gopher.netsys.com or 192.215.1.50 (Login: enews)
 telnet finfo.tu-graz.ac.at or 129.27.2.4 (Login: info)
 telnet info.anu.edu.au or 150.203.84.20 (Login: info)
 telnet nstn.ns.ca or 137.186.128.11 (Login: fred)
 telnet camsrv.camosun.bc.ca or telnet 134.87.16.4
 telnet tolten.puc.cl or telnet 146.155.1.16 (Chile)
 telnet gopher.denet.dk or telnet 129.142.6.66 (Denmark)
 telnet gopher.th-darmstadt.de or telnet 130.83.55.75
 telnet ecnet.ec or telnet 157.100.45.2 (Ecuador)
 telnet gopher.uv.es or telnet 147.156.1.12 (Spain)
 telnet gopher.isnet.is or telnet 130.208.165.63 (Iclnd)
 telnet siam.mi.cnr.it or telnet 155.253.1.40 (Italy)
 telnet gopher.torun.edu.pl or 158.75.2.5 (Poland)
 telnet sunic.sunet.se or telnet 192.36.125.2 (Sweden)
 telnet gopher.chalmers.se or 129.16.221.40 (Sweden)
 +telnet hugin.ub2.lu.se or telnet 130.235.162.12 (Sweden)
 telnet info.brad.ac.uk or 143.53.2.5 (Login: info)
 telnet uts.mcc.ac.uk (Economic Papers here)
 Offers: Access to other services, gophers, documents, etc. (Login: gopher)

-Ham Radio Callbooks telnet callsign.cs.buffalo.edu 2000 / 128.205.32.2 2000
 telnet ham.njit.edu 2000 or telnet 128.235.1.10 2000
 telnet ns.risc.net or 155.212.2.2 (Login: hamradio)
 offers: National ham radio call-sign callbook. (Also: Amateur Radio above)

-History Databases telnet ukanai.cc.ukans.edu or telnet 129.237.1.30
 offers: History databases (Login: history) and CIS info (Login: ex-ussr)
 +ftp byrd.mu.wvnet.edu / ftp 129.71.32.152(/pub/history)
 telnet clus1.ulcc.ac.uk or telnet 192.12.72.60
 offers: Docs, archives, comprehensive history server(Login/Password: ihr-uk)

-HP Calculator BBS telnet hpcvbbs.cv.hp.com or telnet 15.255.72.16
 offers: BBS for HP Calc. users, with chat mode. (Login: new)

-Hpcwire telnet hpcwire.ans.net or telnet 147.225.1.51
 offers: Excellent menu-driven information searches. (Login: hpcwire)

-Hytelnet Server telnet access.usask.ca or telnet 128.233.3.1
 telnet info.ccit.arizona.edu or 129.196.76.201
 telnet laguna.epcc.edu or 192.94.29.3 (Login: library)
 telnet info.anu.edu.au or 150.203.84.20(Login:library)
 telnet library.adelaide.edu.au (Login: access)
 telnet nctucca.edu.tw or 140.111.3.21 (TAIWAN)
 telnet info.mcc.ac.uk or telnet 130.88.200.15
 telnet rsl.ox.ac.uk or telnet 129.67.16.31
 offers: univ. & library catalogues around the world. (Login: hytelnet)

-INFO - Rutgers CWIS telnet info.rutgers.edu or telnet 128.6.26.25
 offers: (CIA World Factbook, Religious/Gov't Texts) Recommend select LIBRARY

-InterNIC telnet rs.internic.net or telnet 198.41.0.5
 offers: Gopher, WAIS, Whois, finger, TONS of Internet info, book orders, etc

-Iowa Politcl. Stk Mkt telnet ipsm.biz.uiowa.edu or 128.255.44.2
 offers: Buy & sell shares in political candidates. (Non profit research proj)

-IP Address Resolver mail resolve@cs.widener.edu

mail dns@grasp.insa-lyon.fr (body of letter: help)
usage: in body-of-letter: site <address here> Mails you IP address of site.

-ISAAC telnet isaac.engr.washington.edu or telnet 128.95.32.61
offers: Info. System for Advanced Academic Computing, for IBM users.

*LAW-----

-Gopher LAW Servers telnet fatty.LAW.cornell.edu or telnet 132.236.108.5
telnet gopher.LAW.csuohio.edu or telnet 137.148.22.51

-Law Library telnet liberty.uc.wlu.edu or telnet 137.113.10.35
ftp sulaw.law.su.oz.au (cd /pub/law)
offers: Law libraries and legal research. (Login: lawlib)
Offers copies of laws for each state/computer laws, and more!

+LawNet telnet lawnet.law.columbia.edu or telnet 128.59.176.83
offers: Law/Judicial info and catalogs access. (Login: lawnet)

-Supreme Court Rulings ftp ftp.cwru.edu
offers: ASCII files of Supreme Court rulings in directory /hermes

-Library Catalogs ftp dla.ucop.edu (pub/internet/libcat-guide)
offers: "Library Catalogs on the Internet: Strategies for Selection
and Use" document (how, but not where; also get one of the following).
ftp ftp.unt.edu (library/libraries.txt)
offers: "Accessing Bibliographic Databases" document.
ftp ariel.unm.edu (library/internet.library)
offers: "Internet-Accessible Catalogs and Databases" document.

-Library of Congress telnet locis.loc.gov or telnet 140.147.254.3
offers: Library of Congress Information System (LOCIS) Offers access
to lib. of congress, legislative info, and copyright info.
telnet marvel.loc.gov or telnet 140.147.2.15
offers: LOC gopher, with access to lots of gov't docs. (Login: marvel)

-LIBS telnet nessie.cc.wvu.edu or telnet 140.160.240.11
telnet info.amu.edu.au or telnet 150.203.84.20
telnet garam.kreonet.re.kr or 134.75.30.11 (Login: nic)
offers: Access to nearly all online services seen in this list. (Login: LIBS)

-List of Lists ftp ftp.nisc.sri.com or ftp 192.33.33.22
offers: List of interest groups/email lists in /netinfo/interest-groups.

-Matchmaker by Email mail perfect@match.com with "SEND FORM" in body of msg
offers: Will reply with instructions and questionnaire.

*MEDICAL/HEALTH/BIOLOGY/GENETICS-----

-Biological Services mail grail@ornl.gov ("help" in body of message)
offers: Service predicting intron-exon splice sites in vertebrate genes.
telnet atcc.nih.gov or telnet 156.40.144.248
offers: American Type Culture Collection (Login: search Password: common)

-CancerNet mail cancernet@icicb.nci.nih.gov
gopher gopher.nih.gov (Health & Clinical Information/)
offers: Cancer info. statements thru email. Body-of-letter:help or spanish

-CHAT telnet debra.dgibt.doc.ca or telnet 142.92.36.15

offers:Interactive AIDS & Epilepsy docs,simulated conversation(Login: chat)

-Educational Tech Net telnet etnet.nlm.nih.gov or telnet 130.14.10.123
offers:Forums and discussion groups on medical tech. and edu.(Login: etnet)

-Genetics Banks mail gene-server@bchs.uh.edu
 mail retrieve@ncbi.nlm.nih.gov
 mail blast@ncbi.nlm.nih.gov ("help" in body of message)
 mail genmark@ford.gatech.edu
 mail blocks@howard.fhcrc.org
 mail cbrg@inf.ethz.ch ("help" in body of message)
 mail QUICK@EMBL-Heidelberg.DE
 mail NETSERV@EMBL-Heidelberg.DE

Subject: help Offers: genetic database/nucleic acid/protein sequence.

-Handicap/Med. Site ftp handicap.shel.isc-br.com or ftp 129.189.4.184
offers: anonymous ftp of software and medical info.

-Monochrome telnet mono.city.ac.uk or telnet 138.40.17.1
offers: Multi-user messaging system (w/ chat) (Login/Password: mono)

-Movie Database Regeest movie@ibmpcug.co.uk with "HELP" in body of message
offers: Info on actors, directors, movies, etc.

*MUSIC-----

-Billboard Charts finger buckmr@rpi.edu
offers: U.S. Top Pop singles for the week.

-Guitar Chords/TAB ftp ftp.nevada.edu or ftp 131.216.1.11
offers: Tablature/Chords for guitar in /pub/guitar. Also at ftp.uu.net

-Lyric/Music Server ftp ftp.uwp.edu or ftp ftp.iastate.edu (in /pub/lyrics)
offers: Lyrics, chords/tablature, and music pictures. (/pub/music/...)

-Music Newsletter mail listserv@vm.marist.edu (internet) or
 mail listserv@marist (bitnet)
Body-of-letter: SUBSCRIBE UPNEWS <your full name> Offers: Reviews, intviews

-Rock/Metl Lyric Quiz finger gim@139.133.202.141 or gim@139.133.202.142
offers: Finger for Rock/Metal Lyrics Quiz. Recommend pipe through more.

-Sid's Music Server mail mwilkenf@silver.ucs.indiana.edu
Subject: BOOTHELP Offers: Lists of rare live recordings, cd's for sale.

-Used Music Server mail Used-Music-Server@cs.ucsb.edu w/ subject: help
offers: Users can buy/sell/trade CDs/LPs/Tapes or subscribe to the list.

-Music List of Lists mail mlol-request@wariat.org (music list of lists)

*NEWS-----

-Freenet telnet freenet-in-[a,b,c].cwru.edu or 129.22.8.38
 telnet yfn.ysu.edu or 192.55.234.27 (Login: visitor)
offers: USA Today Headline News, Sports, etc...

+List-Periodic Posts finger nichol@stavanger.sgp.slb.com
offers: Listing of all FAQs, lists, and periodic postings to Usenet news.

-News Mail Servers mail [newsgroup]@cs.utexas.edu
 offers: Post to Usenet news via email. (eg. [newsgroup] = alt-bbs)

-NNTP Usenet News telnet kufacts.cc.ukans.edu or 129.237.1.30
 Select: Reference Shelf (Login: kufacts) See Also: UNC BBS, Panda Gopher

-NNTP News Servers telnet vaxc.cc.monash.edu.au 119 or 130.194.1.23 119
 telnet munnari.oz.au 119 or 128.250.1.21 119 (AUSSIE)
 telnet etl.go.jp 119 or 192.31.197.33 119 (JAPAN)
 telnet news.fu-berlin.de 119 (GERMANY)
 offers: Post to Usenet news via telnet. (Type HELP after connecting)

-NICOL telnet nisc.jvmc.net or telnet 128.121.50.7
 offers: Access to internet resources, Elec. Publishing Service (Login: nicol)

-NICOLAS telnet dftnic.gsfc.nasa.gov or telnet 128.183.10.3
 offers: Network Info. Center On-Line Aid System (Login: dftnic)

-Nielsen TV Ratings finger normg@halcyon.halcyon.com
 offers: Weekly TV ratings according to the Nielsen rating system.

-Oracle mail oracle@cs.indiana.edu w/ subject: help
 offers: The Usenet Oracle answers all your questions!

-OSS-IS ftp soafl.ssa.gov
 mail info@soafl.ssa.gov with "send index" as your msg.
 offers: Many FAQ's, ftp lists, library and service lists, gov't documents.

-Project Gutenberg ftp mrcnext.cso.uiuc.edu or ftp 128.174.201.12
 offers: Many books in print and almanac files. cd pub/etext

-Public-Access Unix telnet nyx.cs.du.edu or 130.253.192.68
 offers: Free account, with access to various UNIX features. (login: new)

-Public-Access Unix telnet hermes.merit.edu or telnet 35.1.48.150
 telnet m-net.ann-arbor.mi.us or telnet 35.208.17.4
 (Which host: um-m-net Enter 'g' for guest. login: newuser)

-Queer Resource Dir. ftp nifty.andrew.cmu.edu
 offers: AIDS info/gay rights info. Recommen get file: README (cd pub/QRD)

-QUERRI telnet isn.rdns.iastate.edu or telnet 129.186.99.13
 offers: Questions on Univ. Extension. Regional Research Info (Login: querri)

-Recipe Archives ftp gatekeeper.dec.com (cd pub/recipes)
 ftp mthvax.cs.miami.edu (cd pub/recipes)
 offers: Anonymous ftp site for MANY food recipes.

*RELIGION/BIBLE RELATED-----

-Gabriel's Horn telnet 138.26.65.78 7777 (Also see Dartmouth above)
 offers: Returns a Bible verse from the Old or New Testament

-JewishNet telnet vms.huji.ac.il or telnet 128.139.4.3
 offers: WWW w/ info. on mailing lists, restaurants, etc. (Login: JEWISHNET)

*SCIENCE/MATH/STATISTICS-----

- E-Math telnet e-math.ams.com or 130.44.1.100
offers: Am. Math. Soc. bbs w/ software and reviews. (Login/Password: e-math)
- NetLib mail netlib@ornl.gov or mail netlib@uunet.uu.net
offers: Math (usually Fortran) programs via email Body-of-letter: send index
- Nuclear Data Center telnet bnln2.dne.bnl.gov or telnet 130.199.112.132
offers: National nuclear data. (Login: nndc)
- Periodic Table telnet camms2.caos.kunl.nl 2034 or 131.174.82.239 2034
offers: electronic periodic table of elements.
- StatLib Server mail statlib@lib.stat.cmu.edu
Mail with line: send index. Offers: Prgms, Datasets, etc. for statisticians.
- STIS telnet stis.nsf.gov or 128.150.195.40
offers: Science & Technology Information System. (Login: public)
- +The Scientist ftp ds.internic.net (cd pub/the-scientist)
offers: Biweekly paper targeted at science professionals

- SERVICES telnet wugate.wustl.edu or telnet 128.252.120.1
offers: Access to nearly every listed service! (Login: services)
- SFI BBS telnet bbs.santafe.edu or 192.12.12.6 (login: bbs)
offers: Research BBS provides access to info. on Complex Systems.

*SOFTWARE/Information SERVERS-----

- Info/Software Server telnet rusinfo.rus.uni-stuttgart.de or 129.69.1.12
offers: journals, unix stuff, recipes, online cookbook, etc. login: info
- Software Server(ASK) telnet askhp.ask.uni-karlsruhe.de or 129.13.200.33
offers: On-line software search. (Login/password: ask)
- ZIB Electronic Libr. telnet elib.zib-berlin.de or telnet 130.73.108.11
offers: Library of software, links to other libraries. (Login: elib)

*SPACE/ASTRONOMY-----

- EnviroNet telnet envnet.gsfc.nasa.gov or telnet 128.183.104.16
offers: Space environment resource. (Login: envnet Password: henniker)
- Europe Space Agency telnet esrin.esa.it or telnet 192.106.252.1
offers: Access ESA PID (Prototype Info Dir) & ESIS (Eur. Space Info System)
- FIFE telnet pldsg3.gsfc.nasa.gov or telnet 128.183.36.16
offers: Science, etc. databases from satellites, etc. (Login: FIFEUSER)
- Lunar/Planet Instit. telnet lpi.jsc.nasa.gov or telnet 192.101.147.11
offers: Resources on Geology, Geophys, Astron., Astrophys. (Login: lpi)
- NASA Headline News finger nasanews@space.mit.edu
offers: Daily press releases from NASA.
- NASA SpaceLink telnet spacelink.msfc.nasa.gov or telnet 192.149.89.61
offers: Latest NASA news, including shuttle launches and satellite updates.

-NASDA telnet nsaeoc.eoc.nasda.go.jp or telnet 133.56.72.1
offers: National Space Development Agency of Japan (Login: nasdadir)

-NED telnet ned.ipac.caltech.edu or telnet 134.4.10.118
offers: NASA Extragalactic Database. Bibliographies, info. (Login: ned)

-NODIS telnet nssdc.gsfc.nasa.gov or telnet 128.183.36.25
telnet nssdca.gsfc.nasa.gov or telnet 128.183.36.23
offers: Menu-driven access to Nat'l Space Science Data Center (Login: nodis)

-SDDAS telnet esp.sun.space.swri.edu 540 or 129.162.150.99 540
offers: SW Research Data Display & Analysis Center.

-SpaceMet telnet spacemet.phast.umass.edu or 128.119.50.48
offers: Science/space bbs about space exploration w/ info from NASA.

-STInfo telnet stinfo.hq.eso.org or tenet 134.171.8.4
offers: Reports about Hubble Telescope, press releases (Login: stinfo)

*SPORTS-----

-Sports Schedules NBA: telnet culine.colorado.edu 859 / 128.138.129.83 859
NHL: telnet culine.colorado.edu 860 / 128.138.129.83 860
MLB: telnet culine.colorado.edu 862 / 128.138.129.83 862
NFL: telnet culine.colorado.edu 863 / 128.138.129.83 863
finger copi@oddjob.uchicago.edu for baseball schedules
offers: Sports schedules on-line. help for help, return for today's games.

-Stock Market Report telnet a2i.rahul.net or telnet 192.160.13.1
offers: Select n, 12, then 6. (Login: guest)

-Travel Info. Library ftp ftp.cc.umanitoba.ca or ftp 130.179.16.24
offers: Travelogues, guides, FAQs. cd to the directory "rec-travel"

-UMD Info Database telnet info.umd.edu or telnet 128.8.10.29
offers: Info. docs on many subjects, incl. Supr. Crt Decisions (Login: info)

-UNC BBS telnet launchpad.unc.edu or telnet 152.2.22.80
offers: Usenet News, Lib. of Congress, nationwide libs. (Login: launch)

*USER LOOKUP SERVICES/WHOIS SERVICES-----

-Mail Srvr/Usr Lookup mail mail-server@rtfm.mit.edu
in body of mail message: send usenet-addresses/[name searching for]

-Netfind User Lookup telnet bruno.cs.colorado.edu or telnet 128.138.243.151
telnet mudhoney.micro.umn.edu or telnet 134.84.132.7
telnet redmont.cis.uab.edu or telnet 138.26.64.4
telnet ds.internic.net or telnet 198.49.45.10
telnet netfind.oc.com or telnet 192.82.215.92
telnet archie.au or telnet 139.130.4.6
telnet macs.ee.mcgill.ca or 132.206.61.15
telnet malloco.ing.puc.cl or telnet 146.155.1.43
telnet netfind.vslib.cz or telnet 147.230.16.1
telnet nic.uakom.cs or telnet 192.108.131.12
telnet nic.nm.kr or telnet 143.248.1.100
telnet lincoln.technet.sg or telnet 192.169.33.6

telnet nic.uakom.sk or telnet 192.108.131.12
telnet monolith.cc.ic.ac.uk or telnet 155.198.5.3
telnet genie.lut.ac.uk or telnet 158.125.220.8
telnet dino.conicit.ve or telnet 150.188.1.10

offers: Given a name and org./school, finds a user for you (login: netfind)

-Whois Services telnet rs.internic.net or telnet 198.41.0.5
 mail service@rs.internic.net (w/ subject: help OR
 send RFC-xxxx.TXT, with xxxx being the RFC number)
 telnet nri.reston.va.us 185 (Knowbot Info Serv.)
 telnet garam.kreonet.re.kr or 134.75.30.11 (Login: nic)
 ftp sipb.mit.edu (pub/whois/whois-servers.list)

offers: Way to find internet address given a keyword. To access type: whois

-UUCP map entries by mail: mail dns@grasp.insa-lyon.fr (body: help)
usage: in body-of-letter: uucp uucp_site Mails you UUCP map entry

-WAISstation telnet quake.think.com or telnet 192.31.181.1
 telnet SWAIS.CWIS.UCI.EDU or 128.200.15.2
 telnet sunsite.unc.edu or telnet 152.2.22.81
 telnet nmsc.nsf.net or 128.89.1.178 (Login: wais)
 telnet info.funet.fi or 128.214.6.100 (Login: info)
 telnet wais.nis.garr.it or 192.12.192.10 (Login: wais)
offers: Wide Area Info. Service. (Login: swais)

*WEATHER/ATMOSPHERIC/OCEANIC-----

-Auroral/Solar Report finger aurora@xi.uleth.ca or finger aurora@142.66.3.29
 finger solar@xi.uleth.ca or finger solar@142.66.3.29
 finger daily@xi.uleth.ca or finger daily@142.66.3.29

offers: Auroral activity warnings/watches/sightings, updated hourly.
Solar = 3-Hourly solar & Geophysical report, daily is the daily one

-Flood Gopher/Info telnet idea.ag.uiuc.edu or telnet 128.174.123.126
 telnet exnet.iastate.edu or telnet 129.186.20.200
offers: Tons of files for coping with floods and hurricanes (Login: flood)

-NOAA telnet esdim1.nodc.noaa.gov or telnet 140.90.235.168
offers: Nat'l Oceanic and Atmos. Admin. Lots of data! (Login: NOAA DIR)

-Oceanic Info. Center telnet delocn.udel.edu or telnet 128.175.24.1
(Login: info)

-Tropical Strm Forecst finger forecast@typhoon.atmos.colostate.edu
offers: Seasonal forecast for Atl. Ocn. Also: finger forecast@129.82.107.24

-Weather Service telnet downwind.sprl.umich.edu 3000 or 141.212.196.177
 telnet measun.nrrc.ncsu.edu 3000 or 152.1.31.11 3000
 gopher wx.atmos.uiuc.edu or gopher 128.174.80.10
offers: City/State forecasts, ski conditions, earthquake reports, etc.
 telnet 134.178.130.2 55555
offers: Weather service for Australia.

-Weather Maps ftp vmd.cso.uiuc.edu
offers: Surface analysis & current infrared weather maps GIFs. (cd wx)

-Webster Dict. Servers telnet cs.indiana.edu 2627 or 129.79.254.191 2627

telnet chem.ucsd.edu or 132.239.68.1 (login: webster)
offers: Dictionary/Spelling service. Type "HELP" for info. (ALL CAPS!)

-White House Releases mail Clinton-Info@Campaign92.Org with the subject: Help
offers: Subscribe to White House press releases (news, speeches, etc.)

-White House Summaries mail almanac@esusda.gov (in msg: subscribe wh-summary)
Offers: Daily mailing of summary of White House Releases.

-World-Wide Web telnet www.njit.edu or telnet 128.235.163.2 (USA [NJ])
telnet FATTY.LAW.CORNELL.EDU or telnet 132.236.108.5
telnet info.cern.ch or telnet 128.141.201.74 (SWISS)
telnet vms.huji.ac.il or telnet 128.139.4.3 (ISRAEL)
telnet ukanai.cc.ukans.edu or 129.237.1.30 (USA[KA])

offers: Access to various documents, lists, and services. (Login: www)

- * NOTE: NO LOGIN NAMES OR PASSWORDS ARE REQUIRED UNLESS STATED OTHERWISE! *
- NOTE: FOR FTP SITES, LOGIN AS anonymous, Password is your email address.
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On, Locating Addresses On The Internet,

Find Your Friends And Email Your Enemies

BY KEVIN M.
SAVETZ

The Internet is a vast place. Over a million computers and hundred million users are connected in this sprawling anarchy of data. Both newcomers and old-timers often want to find the electronic address of an associate. With an electronic mail address in hand, you can send electronic notes, love letters, or secret messages to your associates, friends, and enemies.

The problem is finding them.

With so many computer systems and users in the world, it is impossible to keep a complete "white pages" of the Internet. The problem is compounded because people—especially students—come and go from the net all the time. Storing and updating that much information would be an impossible task.

But it's not impossible to find people on the net. Programs exist which, given some amount of information about your victim—er, associate—can help you track down his or her email address. The more information you know about your associate—name, place of business or school, and so on—the higher your chances are. If you want to get in touch with a pal from your past, but you don't know where he works or what city he lives in, you're not likely to locate him, even if he is on the net.

Of course, to be listed in any of these services, you need to have an account on the Internet; and, to some extent, you must want to be found.

The systems we will look at are finger, netfind, the MIT Usenet search, and Knowbot Information System. Each system works differently. Even though you may find someone when using one service, there is, of course, no guarantee she will be listed in another. There is no guarantee you will find her at all.

FINGER

UNIX, VMS, and some other systems support a command called "finger." Finger can give basic information about a user on a given computer. It usually allows searches by first name, last name, or login name. To list users named Ron on your local system, "finger ron" should produce a list of everyone whose name or login contains "Ron." Finger may return

information including the user's real name, login, and a phone number and other personal information, if these are supplied.

On many systems, finger allows you to peruse the users of other systems. "Finger ron@hal.gnu.ai.mit.edu" will tell you about the Rons with accounts on a certain computer at Massachusetts Institute of Technology. This in itself is not too powerful, however, because it requires that you know the name of the computer system you are searching. When you are searching for an associate, this usually isn't the case. Once you know the computer system and login name, you really know enough to send electronic mail.

Finger's power, however, grows when used in conjunction with services such as netfind, which scour the network for the names you

themselves from the outside world. Some sites, for privacy or security reasons, do not allow offsite users to finger their computers or access other information. Although this may be best for the company, it hinders netfind, which uses this information, when it can, to search.

Netfind can be used either as a client program running on your local computer, or accessed by telnetting to one of several public servers. The public servers don't require the netfind software to be on your local host, so we'll look at that venue for searching.

To use netfind, telnet to bruno.cs.colorado.edu (or another netfind server, listed below) armed with the name to search for, and his or her place of business or school. At the "login" prompt, type "netfind." Servers are limited to a certain number of searches at any given time, so you may be denied access. If so, try again later or choose a different server.

Netfind displays a menu of selections. To search for a specific person, enter "2" (search). You'll then be asked to "enter person and keys." Enter one word for the name, followed by one or more words defining where to look. For instance, "simon san diego state univer-

EXAMPLE OUTPUT FROM "FINGER" COMMAND

```
% finger john@euclid.humboldt.edu
[euclid.humboldt.edu]
Login name: john In real life: John
Wallace
Directory: /usr/john
No Plan.
Login name: jmoore In real life: John
Moore.
Directory: /usr/jmoore
No Plan.
```

want, given just an idea of where to look.

NETFIND

Netfind is a "white pages" service that uses a number of sources to find electronic mail addresses. Netfind can locate users at over five thousand sites worldwide. The majority of the domains it can access are educational institutions, so this service is very good for locating students at school. However, netfind can also access a vast number of commercial, military, government, and other organizational computers. Its operators estimate that it can locate about 5.5 million people. Netfind is used interactively, and is relatively quick.

It works best for sites that do not insulate

PUBLIC NETFIND SERVERS

bruno.cs.colorado.edu
(128.138.243.151) [University of Colorado]
archie.au (139.130.4.6) [AARNet, Melbourne, Australia]
malloco.ing.puc.cl (146.155.1.43)
[Catholic University of Chile, Santiago]
mudhoney.micro.umn.edu
(134.84.132.7) [University of Minnesota, Minneapolis]
netfind.oc.com (192.82.215.92)
[OpenConnect System, Dallas, Texas]
redmont.cis.uab.edu (138.26.64.4)
[University of Alabama, Birmingham]
sun.uakom.cs (192.108.131.11)
[Slovak Academy of Sciences]

sity" will check for San Diego State in netfind's seed database. If it has something to go on, it will begin checking domain names for the keys. If not, try a less restrictive key (in this case, just "san diego.")

Next is a search for hosts. Netfind uses several remote services, including the "finger" command and the Simple Mail Transfer Protocol (SMTP) to simultaneously query each computer that might have an account name, in this case "Simon." (It's actually much more complicated than that: a full explanation is available online.)

If netfind finds too many machines that match your keys, it will list them and ask you to choose up to three.

If a potential match is made, netfind gives you as much information as it can. If there is no match, or it can't get access to information from a secure site, you are told why.

Incidentally, choice "3" from the main menu, seed database lookup, lists all the computers associated with an organization, but does not look for a specific person.

KNOWBOT INFORMATION SERVICE

The Knowbot Information Service (KIS) is another "white pages" service that performs a very broad name search, checking MCI Mail, the X.500 White Pages Pilot Project, WHOIS servers at various organizations, and the UNIX "finger" command. It can be used either as a client program resident on your local machine, through email, or by telneting to a public server.

KIS uses subprograms called "Knowbots" to search for information. Each Knowbot looks for specific information from a site, and reports back to the main program with the results.

Two hosts running KIS servers are "nri.reston.va.us" and "sol.bucknell.edu." You can access either one by electronic mail (send mail to netaddress@nri.reston.va.us, for instance) or using telnet (request port 185.) Because searching can take several minutes, I prefer to use the mail method—once KIS knows the results of the search, it mails them back to you.

In the body of your mail message to netaddress, simply put names of your associates, one per line. You may use first and last names or a login, if you know it. Sending "johnson" will search the default list of directory servers for user "johnson." Since KIS checks a predefined set of services, you do not need to supply an organization name to check for.

KIS also includes commands for narrowing your search and searching for an organization. For more help, put "?" or "man" in the body of your mail message.

AN INTERACTIVE NETFIND SESSION

Top level choices:

1. Help
2. Search
3. Seed database lookup
4. Options
5. Quit (exit server)

→ 2

Enter person and keys (blank to exit)
→ simon san diego state university

(0) check_name: checking domain sdsu.edu. Level = 0 (1)

check_name: checking domain sdsu.calstate.edu. Level = 0

The domain 'sdsu.calstate.edu' does not run its own name servers, and there is no aliased domain IP address for this domain.

→ Skipping domain search phase for this domain.

(0) do_connect: Finger service not available on host sdsu.edu → cannot do user lookup

Search of domains completed.
Proceeding to search of hosts.

(0) check_name: checking host sciences.sdsu.edu. Level = 0

(2) check_name: checking host steer.sdsu.edu. Level = 0

(3) check_name: checking host saturn.sdsu.edu. Level = 0

(4) check_name: checking host ucseis.sdsu.edu. Level = 0

SYSTEM: sunstroke.sdsu.edu
Login name: dsimon In real life: David Simon

Directory: /sunstroke/faculty/dsimon
Shell: /bin/csh

Last login Fri Dec 4 16:09 on pop from lif_sci_s1-mac7

No unread mail

No Plan.

Login name: alsimon In real life: Al Simon

Directory: /sunstroke/faculty/alsimon
Shell: /bin/csh

Last login Thu Dec 3 11:50 on tty7 from mdmsrv9.sdsu.edu

Mail last read Wed Dec 2 11:46:40 1992

No Plan.

(9) do_connect: Finger service not available on host birooni.sdsu.edu → cannot do user lookup

SUMMARY:

- Found multiple matches for "simon", so unable to determine most recent/last login information, or most promising electronic mail information.

Please look at the above search history and decide for yourself which is best.

USENET SEARCH

The Usenet search is an interesting variation in ways to look for people on the net. This method compares your search request to a database of people who have recently posted messages to the Usenet. (The Usenet is a worldwide bulletin board of sorts, where people send public messages on every imaginable topic.)

SAMPLE OUTPUT FROM THE USENET SEARCH

send usenet-addresses/George Washington

>From daemon@pit-manager.MIT.EDU Tue Dec 15 16:21:37 1992

Date: Tue, 15 Dec 92 19:21:04 -0500

To: waffle@steer.sdsu.edu (waffle)

Subject: mail-server: "send usenet-addresses/George Washington"

gw@washington.burial.site (George Washington) (Oct 11 92)

hustler@u.washington.edu (hustler@milton.u.washington.edu) (Apr 1 92)

Goofster@u.washington.edu (goofster@milton.u.washington.edu) (Apr 1 92)

George Porter <george_porter@LIBRARY.LIB.NCSU.EDU> (Apr 12 92)

George Izumi@p0.f129.n102.z1.fidonet.org (George Izumi) (Apr 12 92)

george@cs.purdue.EDU (Michael J. George) (Apr 12 92)

George.Dvorak@f303.n273.z1.fidonet.org (George Dvorak) (Apr 1 92)

george@eos03a-16pa.eos.ncsu.edu (George J. Gad El-Karim) (Apr 12 92)

george_mah@sfu.ca (george mah) (Apr 1 92)

gng@gaia.UUCP (George George) (Apr 1 92)

george@jvd.msk.su (George Tereshko) (Apr 1 92)

"mail-server@pit-manager.mit.edu." The server will ignore the subject line. In the body of your message, send "send usenet-addresses/keys." "Keys" can be one or more search words separated by spaces. It can be the first and last name, a login name, or the name of an organization. (If you send only the name of an organization, you will receive a list of all the posters from that place.)

You can guess about the words that may appear in the address of the person you are searching for: it's okay if some of the keys don't appear in the address. The search program uses "fuzzy" matching and tries to find

addresses that are closest to your keywords. Forty or fewer matches will be returned, listed from "best" to "worst."

For more help, send a message to mail-server@pit-manager.mit.edu with a message body of "send usenet-addresses/help." If you need to talk to a real person, send mail to "postmaster@pit-manager.mit.edu." The online help

should be all you need, though.

WHAT ABOUT PRIVACY?

Each of these information resources uses only "public" information from computers that are open to outside access from the Internet. As mentioned before, some sites are more limited for privacy or security reasons. In open sites, however, some users may be unaware that information about them is available. Sometimes, standard information available includes not only an electronic mail address, but a phone number, fax number, or office address.

If you feel the need to protect yourself, you are not totally without aid. You may be able to limit the amount of information available to the outside world. On some UNIX systems, the command "chfn" (change finger name) will allow you to change your name and other data as it appears on your system. Also, many computers allow you to create a file called ".plan" for information about yourself—this is readable by anyone. Don't keep anything there that you don't want the world to know.

The help text on netfind sums it up best: "I have come to the conclusion that resource discovery and directory service are fundamentally at tension with privacy. I believe that while policies are needed, ultimately users need to be made aware that participation in an 'electronic society' brings with it some loss of privacy, just as being a member of any

society does."

FOR MORE INFORMATION

If all of these services fail you, don't despair. There are other services out there, run by businesses that list only their employees, for instance. Although some of these services are checked by KIS and netfind, many are not.

Also, don't forget the other ways to find someone: pick up the phone and call, or write a letter. Remember that even if you do find the right email address, the owner may never check his or her mail!

For more information, read: "FAQ: How to find people's E-mail addresses," available from mail-server@pit-manager.mit.edu by sending "send usenet/news.answers/find-ing-addresses."

A useful book is *!%@: A Directory of Electronic Mail Addressing and Networks* by Donnalyne Frey and Rick Adams. ISBN 0-937175-15-3, published by O'Reilly, Email nuts@ora.com for information. (Current edition published in January 1991: \$27.95 cover price.)

Another is *Zen and the Art of the Internet: A Beginner's Guide*, by Brendan Kehoe, Prentice Hall, July 1992. ISBN 0-13-010778-6. (Second edition.) The first edition is available for free online. To find out how to get it, send mail to archive-server@cs.widener.edu with "send zen hints" in the body of the message. ■

AN INTERACTIVE KIS SEARCH

Knowbot Information Service (V1.0). Copyright CNRI 1990. All Rights Reserved.

Try ? or man for help.

> Smedley

Name: John X. Smedley

Organization: Smedley Research

City: New York

State: NY

Country: US

E-Mail: 123-4692@mcimail.com

Source: mcimail

Idnet: 123-4692

Last Updated: unknown

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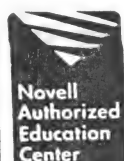
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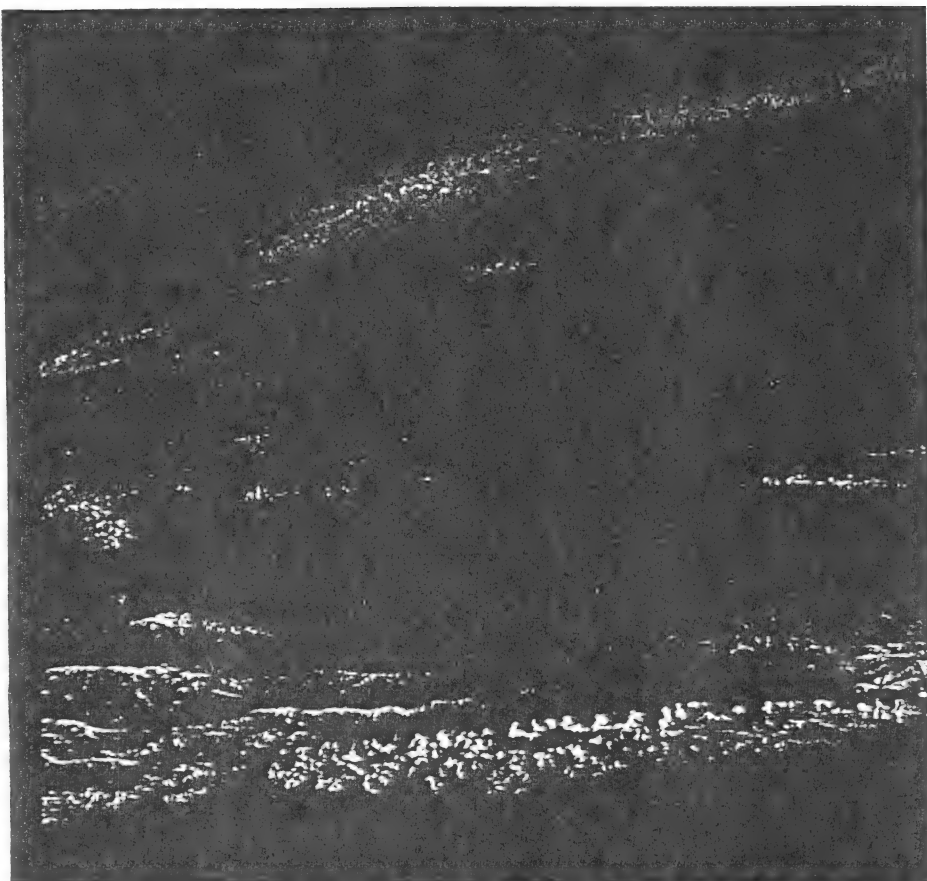
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FAX: (505)277-3614
E-mail: abudge@spock.unm.edu

The man responsible for handling questions or problems is Dr. David E. Pitts, Manager, Flight Science Branch, SN15, National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, TX 77058;

PLUG IN, LOG IN, TUNE IN - INTERNET TALK RADIO: The message is the medium

By Kevin M. Savetz

From the depths of cyberspace, a new medium has emerged. "Internet Talk Radio," is a new information service that is blurring the line between the online world and traditional media.

Internet Talk Radio (ITR) distributes weekly "radio shows" via the Internet's anonymous FTP service. Each show - a half hour or an hour long - can be downloaded to a workstation or home computer and played using audio playback software. Unlike a myriad of other Internet newsletters and journals, Internet Talk Radio is the only one that actually speaks.

Each show is composed of several .au format sounds which can be played on a Sun or NeXT workstation, among other machines. Personal computer users can also listen in, but (depending on the computer) you may need to convert the ".au" sounds into a format more familiar to your hardware.

All this talk comes at a price, however. A typical hour-long radio show consumes a whopping 20 megabytes of disk space. Despite its slow sampling rate of 8KHz, ITR is a memory hog.

Carl Malamud is the founder of ITR. "The idea for ITR came from my frustration with the trade press. I knew they weren't providing the information I wanted and was looking for an alternative." He notes that the trade press focuses on marketing and reviews, leaving a gap for a general-interest, technically-oriented publication for Internet users. "I couldn't start a magazine because it takes money to print and distribute a magazine," he said. Malamud turned to the Internet as a general-purpose distribution method.

"I looked at the trends in multimedia support on the Internet, at the number of users with more and more bandwidth and bigger disk drives, and decided to give 'radio' a try," he said.

Some net users have criticized the talk radio concept as a grandiose waste of network bandwidth, given the fact that the same information in text format could fit into only a few kilobytes. "The reason you get audio information from a \$3,000 (or \$30,000) computer," Malamud said, "is because ultimately this gives you a very new medium. We're not trying to replace radio, just as the trucks didn't replace the railroads and the telephone didn't replace the telegraph. There are things we can do that you can't do on a radio, like go interactive or add WAIS databases to support a program, or use general-purpose languages like PERL to make an audio-on-demand server..." It is the versatility of ITR that is its selling point.

ITR's parent company, Internet Multicasting Service, isn't doing this just for glory. Each program carries sponsors, and a minute of each program is given to acknowledge the supporting vendors. The blurbs aren't quite commercials; they resemble public TV's post-show sponsor messages. ("Brought to you by a grant from Frobnitz Corp., and viewers like you!") Current sponsors include Sun Microsystems and O'Reilly & Associates book publishers.

DON'T TOUCH THAT DIAL...

For the most part, ITR consists of interviews. Whether they're talking with the "Geek of the Week (a featured member of the technical community)" or focusing

on "the new American reality" in the "Tech Nation" show, it all boils down to people conversing with each other. Like the name says, Internet Talk Radio parallels its mainstream counterpart. Except ITR is a lot more nerdy.

TechNation is a weekly radio show that focuses on "the new American reality" - that the U.S. has become the "tech" nation. The premise is that this new reality is causing introspection - "Americans are looking at who they are and where they are going."

Tech Nation is hosted by Dr. Moira Gunn, a former NASA scientist and robotics engineer. She focuses on uncovering core issues as well as important technology announcements. Unlike "Geek of the Week," which is only distributed via the Internet, Tech Nation is broadcast over the Public Radio Satellite System, which makes the show available to nearly 600 radio stations in the United States. The show has been produced in the studios of KQED in San Francisco since 1987, and became part of ITR's schedule in March of this year.

Interviews on Tech Nation have included Dr. Linus Pauling, two-time Nobel Prize Winner; Jane Metcalfe & Louis Rossetto, Editors/Publishers of "Wired" magazine" and Bill Koch on winning the America's Cup. Occasionally the program seems narcissistic, like when Gunn interviewed Carl Malamud, the creator of Internet Talk Radio.

"Geek of the Week" is a weekly interview with prominent members of the technical community. The show focuses on "sophisticated discussions of issues facing the Internet, networking, and computing." Malamud calls it "the intelligent alternative to today's trade press."

In April, Malamud introduced a cousin to ITR, called Internet Town Hall, which includes audio recordings of speeches. In the first week they released speeches by the Dalai Lama, Bob Dole, Hershel Shanks on the Dead Sea Scrolls, and the hearings by Congressman Markey on encryption and privacy.

Internet Town Hall programs are good

to pick and choose from. Unlike ITR, Town Hall doesn't necessarily focus on computers and technology. One program consisted of Secretary Bruce Babbitt presenting Clinton's environmental program to the National Press Club. This sort of archival sound information could prove useful for those of us who don't want to watch C-SPAN all day. If you find you need information from a speech given last month, Town Hall might be the forum to find it.

LISTENING IN...

The programs sound good, considering the medium is in its infancy. After a snazzy musical introduction, Malamud announces (in his best DJ voice,) "This is Internet Talk Radio, flame of the Internet." Sound quality isn't great. Most of one program suffered from speakerphone syndrome: it sort of sounded like the voices were coming from the middle of an empty room. Malamud said the sound quality is improving "as we learn how to use our equipment and adapt it to the realities of this rather strange publishing platform."

Sound quality aside, the programs are indeed interesting to listen to. Its nice to be able to hear the voices behind the technology. One interview featured Brewster Khale, the father of WAIS, Inc. and the Wide Area Information Server. Conversation flows neatly from one topic to the next. The interview breaks for an offbeat selection such as "The Incidental Tourist" (restaurant reviews, one which featured ways to achieve gastronomic heights in the basements of Asian Department stores,) a book review, or "Name that Acronym," delivering an "arcane acronym to reverse engineer."

Sun workstation listeners only need the system's "audiotool" program to listen in. Listening on a PC requires SoundBlaster or some other audio source, plus a program that plays ".au" files or converts them to ".wav" files. Macintosh users need a program to convert ".au" to "audio IFF" format. Everyone needs enough disk space and memory to hold 5-megabyte chunks of the program. (Information on finding the free conversion utilities is available from Info@radio.com.)

WHERE TO FIND INTERNET TALK RADIO

Internet talk radio files are available from a variety of anonymous FTP sites worldwide. You should be able to find them at the following sites, but check the updated list to find your closest site.

Northern Arizona University, Flagstaff, AZ: [ftp.nau.edu](ftp://ftp.nau.edu) (134.114.64.70) in directory /talk-radio.

Oregon Graduate Institute, Beaverton, OR: [cse.ogi.edu](ftp://cse.ogi.edu) (129.95.20.2, 129.95.40.2, or 129.95.46.2) in directory pub/talk-radio.

University of Oregon, Eugene, OR: [ftp.uoregon.edu](ftp://ftp.uoregon.edu) (128.223.32.35) in directory /pub/Internet-talk-radio.

ITR is also available via the World Wide Web in <http://www.ncsa.uiuc.edu/radio/radio.html>.

As compression technology advances, ITR (and its eventual copycats) will be able to stuff longer programs into less space. This may be essential to the proliferation of the medium. At about half a minute of sound per megabyte, ITR doesn't have time to waste.

FOR MORE INFORMATION...

For more information, send electronic mail to info@radio.com. You'll automatically receive the <basic ITR information. For an updated list of sites that carry ITR, send e-mail to sites@radio.com.

The latest information, including program schedules, is available on the Usenet group alt.internet.talk-radio.

Kevin M. Savetz is a writer and Internet junkie living in Arcata, California. His e-mail address is savetz@rahul.net.

We have packaged all these RFCs to make available on the Boardwatch BBS in the Internet file area under PEM-RFC.ZIP and MIME-RFC.ZIP.

USENET ORACLE - WHIMSICAL KNOW-IT-ALL OF THE INTERNET

by Kevin Savetz

Have you talked to the Usenet Oracle? He can answer all of your important questions: "What's the meaning of life? Where does the dryer put the socks it steals from the wash? How much wood could a woodchuck chuck if a woodchuck could chuck wood?" Or, he could <ZOT> you into a smoldering pile of ashes. Either way, he's a great guy.

The Usenet Oracle isn't really a person. It's an electronic mail service run by Steve Kinzler, a graduate student and systems administrator at Indiana University. Send the Oracle your question, and within a few hours, you'll receive an answer from the all-knowing one.

The Oracle is a cooperative effort for creative humor. When you send a question to the Oracle server, your message is actually forwarded to someone else who uses the program. He or she mails a (hopefully witty) answer back to the Oracle server, which forwards it to you. Thanks to the server program, all of this is done anonymously - the questioner (or "supplicant") and the answerer (that is, the Oracle incarnate) never know who each other are.

The Oracle started as a program running on an Indiana University computer system. The program became popular, so Kinzler, with the help of hacker Ray Moody, created a network version of the service. The best questions and answers - as selected by volunteer "priests" - are distributed in "Oracularity digests" on the Usenet group "rec.humor.oracle." Oracularities on that group are read by an estimated 26,000 people. Over 700 additional readers (who presumably can not access the Usenet) subscribe to the Oracle mailing list, receiving the Oracularities via e-mail. To date, over 10,000 people have participated by sending in a question or an answer.

Over time, the Oracle has developed his own personality. Writers incarnated as the Oracle often blend in known aspects of his persona: an inflated ego, a sense of humor, his girlfriend Lisa, and the propensity to <ZOT> his less fortunate supplicants.

Why did Kinzler start the Oracle? "Well, it was fun most of the time. Challenging frequently from a programming and system design perspective. But mostly it was that typical hacker's motivation: when a great idea comes along, it just deserves to be done. I thought an e-mail Oracle was a great idea, had the resources and desire to do it, and so I did it. Part of my interest in the Oracle was experimental - I wanted to see what would come of it, what people would do with an interactive, anonymous system like this."

Kinzler (kinzler@cs.indiana.edu) calls the anonymous mail aspect of the Oracle server a crucial aspect of its popularity. "Anonymity gives more people the security to try to be witty or funny in their creative writing. I hope to include people who discover through the Oracle they can and can enjoy writing creatively. And the Oracle gives them a guaranteed audience of two, and, if they're lucky, maybe tens of thousands."

For more information about the Usenet Oracle, send electronic mail to "oracle@cs.indiana.edu" with a subject line of "help." To ask a question, the subject line should include the words "tell me" and the body of the message should contain your question. (If you don't grovel to the sometimes-egotistic Oracle, you may find that you've been <ZOT>ted to oblivion, so you may want to pander to his ego!) You should receive an answer in a day or two, probably much sooner.

Once you ask a question, the Oracle may ask you to answer somebody else's question, as a sort of payment for services. You should respond with the most witty answer possible, so that the supplicant feels gratified in his or her quest for knowledge. If you can't think of a worthy reply, do nothing and the question will be sent to someone else. If you wish to answer a question without ask-

ing one, just send a message to the Oracle server with a subject line of "ask me."

If you don't have access to "rec.humor.oracle" and would like to receive the Oracularities, send mail to "oracle-request@cs.indiana.edu." To get on the distribution list, include a subject line of "subscribe"; to remove yourself from the list of recipients, put "unsubscribe" in the subject line.

[Kevin M. Savetz is a recent graduate from Humboldt University living in Arcata California. He needs a job. He can be reached at savetz@rahul.net]

Some Internet Resources For Educators

Archie: This Internet service helps you find programs, data or text files wherever they are available on public servers. It indexes about 1,200 servers and 2.1 million files, letting you search using combinations of words or text strings. To give Archie a spin, telnet to

archie.unl.edu

and login as 'archie'.

CORE: (California Online Resources for Education) provides Internet services free for K-14 educators in California. To request an account, call 1-800-272-8743 or 209-278-4872 during regular business hours, or fax 209-278-4849. Once you have an account you can log in to the network directly by dialing 209-278-4265 (1200 baud) or 209-278-4615 (2400 baud) or via local access points at each CSU campus. The access number in Arcata is 822-6205.

Cleveland FreeNet: This is a comprehensive and very user-friendly host system, part of the National Public Telecomputing Network. Telnet to

freenet-in-a.cwru.edu

or access this system via the CORE "Outside Services" menu. You will be prompted to sign in as a guest and explore or apply for an account. Check out "Academy One," an experimental program designed for K-12 students and educators.

Dartmouth College Library: Telnet to lib.dartmouth.edu for online services including the CIA's World Fact Book, biographies, full text of 33 Shakespeare works, electronic dictionary and encyclopedia services, the Bible and more. This service may also be access via the CORE "Outside Services" menu.

EcoNet: This is a specialized, non-profit system operated by the Institute for Global Communications that focuses on global networking for environment, peace, social justice and conflict resolution. Among more than 1,200 electronic conferences on a wide range of subjects, this system offers extensive resources for environmental education, including the Alliance for Environmental Education's online network (see the en.enveducation conference), the Global Rivers Environmental Education Network (see gr.teacher), and the International Education and Resource Network (see iearn.teacher). EcoNet operations are supported by user fees, but costs are low if you telnet to igc.apc.org to log in to your account. For details or to sign up, e-mail econet@igc.apc.org or call 415-442-0220.

ERIC: The Educational Resources Information Center (ERIC) is a federally-funded national information system that provides access to an extensive body of education-related literature. ERIC provides a variety of services and products at all education levels.

In November, 1992, ERIC began a five-month prototype program called ASK-ERIC. Drawing on the extensive resources of the ERIC system, ASK-ERIC is an on-line librarian for education, and can provide a question-answering,

help and referral service for k-12 educators.

You can e-mail ASK-ERIC at ask-eric@rodan.syr.edu

You also can access and search the ERIC database directly via telnet, if you have a valid ID for a library that has paid for the service, which has been privatized by your federal government. (University of California library card holders can get access via Melvyl using CORE.)

Geographic Name Server: For geographic information on U.S. cities, counties and North American places by name, state/province or zip code, telnet to

martini.eecs.umich.edu 3000

Gopher: Telnet to

rain.psg.com

and login as 'gopher'. Here you will find information on other gopher servers, and files listing many resources of interest to educators.

For another good Gopher server, telnet to sunic.sunet.se and log in as 'gopher.' This one provides direct access to many online library services.

K-12Net: A loosely-organized, totally decentralized network of school based/oriented "electronic bulletin board systems" (BBS's) throughout North America, Australia, and Europe that share curriculum-related message bases or "echo forums," classroom-to-classroom projects, and educational files. The K-12Net forums are linked to conferences accessible via the CORE and EcoNet systems.

KIDLINK: A global project using listserv mailing lists, intended to give teachers and kids an opportunity to communicate with one another. Send e-mail to listserv@vm1.nodak.edu leaving the subject line blank, and in the body of the message write

GET KIDLINK GENERAL

A file with details on the project will be automatically e-mailed to you.

KIDSNET: A listserv group providing a global network for children and teacher in grades K-12. To subscribe, send e-mail to kidsnet-request@vms.cis.pitt.edu leaving the subject line blank, and in the body of the message write

SUBSCRIBE KIDSNET

You will automatically be subscribed to KIDSNET.

NASA SpaceLink: Telnet to 192.149.89.61 and log in as NEWUSER for NASA's educational service, with information on space exploration, updates on space shuttle launches and more. This service is also accessible via CORE's "Outside Services" menu.

SCHLNet: The new Internet version of FrEdMail, the free educational e-mail network, is a collection of moderated and monitored conferences for K-12 educators and students, available via the CORE Computer Conferencing service.

World-Wide Web: For a peek at what the Internet's future holds in store, telnet to

info.cern.ch

This is an experimental hypertext-based system for finding and accessing Internet resources at the European Particle Physics Laboratory. WWW presents information with key words highlighted. These words are links to other documents (often on other servers) that may be text, files, pictures or data. It works much better if you first download a WWW client program for a Macintosh or Windows.

Further Reading

Krol, Ed. The Whole Internet User's Guide & Catalog. O'Reilly & Associates, 103 Moris St., Suite A, Sebastopol, CA 95472; (800) 338-6887. 1992.

Todino, Grace and John Strang. Learning the UNIX Operating System, Single Session Overview. O'Reilly & Associates. 1989.

"Internet Resources Directory" (filenames IRD1, IRD2 and IRD3), available from the rain.psg.com Gopher server in the "School Computing" directory. (See Gopher, above.)

This resource guide was prepared by the Alliance for Environmental Education and EcoNet.



E C O N E T

alliance@igc.apc.org

econet@igc.apc.org

(updated 1/8/93)

BIX ANNOUNCES FULL ACCESS TO THE INTERNET

The Byte Information Exchange (BIX) has travelled an interesting road as an online service. Originally part of McGraw-Hill's BYTE Magazine, it was sold to General Videotext a year ago. The service has always attracted a core user group of technical people, but not a lot of the consumer market.

The service has recently been playing to their strong hand, with posters and so forth noting "No Hair Styling Tips," a play on the alt.anything approach taken by most of the larger consumer services.

In June, the service announced Full Access to the Internet allowing callers to use ftp and telnet functions to browse the global Internet quite freely, in addition to the basic electronic mail functions. And both BIX, and their sister service, Delphi, have decided to enhance this Internet access in every way possible.

Dealing with the Internet can be like drinking from a firehose. Without some guidance, callers might wade through millions of pages of text to find what they're looking for. To help solve this problem, BIX has integrated Internet access into each of its Exchanges, with topics that contain messages describing related information on the Internet and how to get it. In this way, BIX callers can find needed information and have an area to post messages about their Internet travels. BIX will act as an Internet tour guide.

Basically, they are also enlisting the aid of their 200 Exchange moderators to be tour guides as well, and encouraging them all to get familiar with the Internet, and stand ready to answer questions and help callers out with finding the good stuff on the net. We're not sure such a level of assistance is available anywhere else on the Internet at all. This human tour guide "value added" component, coupled with actually placing Internet materials and connections into individual Exchanges, makes BIX and Delphi the first commercial service we've seen to add Internet connectivity without simply throwing it on the system and hoping nobody used it much until management could figure out if it was a cow or a camel.

Internet access is provided as part of the standard BIX membership. BIX users can use telnet to log on to remote services, ftp to transfer files from a remote archive, or use finger, whois, and other tools as well. Usenet newsgroups and gopher will be added in the near future. There are no surcharges or transfer limits imposed by BIX on these services.

Joining one of the most popular recent trends among the commercial services, BIX is releasing a Windows terminal program for the service. Titled BIXNav, this terminal program provides grunt/click access to many features of the service. The program is adequate to the task, and the BIX crowd, largely technical aficionados, won't likely have any difficulty installing the program. We found installation unusually cryptic for a Windows application, with no built in lists of telephone numbers, and some things setup during initial configuration that we just couldn't

find a way to change later, even by starting over with the initial configuration setup program. The full bevy of technical detritus from 15 years of modem history is displayed in panels featuring skads of options that are probably unnecessary in this type of program. Once installed, like most of this genre of Windows access program, it was pretty, and did speed the process of dialing and navigating the service. The program is actually pretty preliminary and an upgraded version is due in September.

BIX's pricing has also proven popular. The basic deal is \$13 per month plus connect charges of \$3 per hour. But they also offer a 20/20 plan that provides 20 hours of evening/weekend access for \$20 per month that has been very well received. And they do offer a special trial membership of 5 hours access for \$5. Users can sign up for this special offer and take a month to explore the service with no obligation. To join, dial by modem (800)695-4882 or telnet to x25.bix.com. At the login prompt, enter bix, and at the Name? prompt, type bix.internet. You can also reach the service by voice at (800)695-4775. For individual callers looking for "full internet access," this 20/20 plan is hard to beat. General Videotext now claims a user base of 100,000 between BIX and Delphi. BIX, 1030 Massachusetts Ave., Cambridge, MA 02138.

San Francisco Chronicle

BUSINESS^{EXTRA}

PEOPLE IN BUSINESS PAGE C3
TECHNOLOGY PAGE C3
DATA BANK PAGE C6

THE INFORMATION SUPERHIGHWAY GOES COMMERCIAL

I · N · T · E · R · N · E · T

Millions of users plug in to huge computer network

BY JOHN ECKHOUSE

Chronicle Staff Writer

Millions of the world's most plugged-in people spend hours each week surfing at near-warp speed on a wave of information called the Internet.

Launched by the U.S. Defense Department to promote communications between the military and industry, and nurtured by university researchers, this network of networks — 11,000 in all — links users in 200 countries from A (Australia) to Z (Zambia). They dig into databases and exchange mail, research and gossip on topics from aeronautics to zymurgy.

The number of people hooked to the Internet has grown exponentially — from about 2,000 in 1981 to about 15 million today. About a million more are linking up each month.

The Internet moves data by relaying traffic in packets from one computer network to another. If a particular network or computer is down or busy, the network is smart enough to reroute the traffic automatically.

The commercial potential of the Internet hasn't escaped the notice of corporate America. But companies have to work around the U.S. government's so-called appropriate-use policy, which bans profit-making use of the government-financed, high-speed backbone of the network.

Sensing the need — and money to be made — in making it possible for profit-making companies to communicate, groups of telecommunication-service providers have formed networks within the Internet to carry commercial traffic. Commercial activity accounts for 29 percent of all traffic on the "net," as it's widely known, and represents the fastest-

growing Internet application. Having an Internet address — a combination of letters and symbols — on one's business card has become a badge of honor. When a national advertising agency opened a new outpost in Silicon Valley this month, its announcement boasted that it was "the first Bozell office with an Internet address."

Editorial Inc., a Rockport, Mass.-based publisher, sells books through the commercial side of Internet. More than 15,000 people worldwide used their computers to download a free on-line sample of a book about Internet. Several thousand Internet users are expected to pay \$5 for the full text of another book, "Bed and Breakfast in New England," which will carry a cover price of \$10.95 when it debuts in stores next month.

Future on-line books might contain video images or sound — such as a bird guide that shows hawks in flight and includes snippets of their cries. Internet aficionados with the proper computer peripherals — video cards and sound cards — could download such books, according to Laura Fillmore, president of Editorial Inc.

Many corporate users say Internet can be the only way to get certain kinds of work done or the only way to stay ahead of competitors. Blaine Berger, an IBM researcher in Boulder, Colo., says he used Internet to obtain key software for use in interpreting digitized maps.

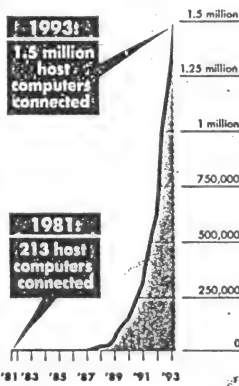
The pertinent data would not have been available in print for nine months.

"Can you imagine the value of saving nine months of time?" muses Howard Funk, technical assistant to IBM's vice

INTERNET: Page C7 Col. 1

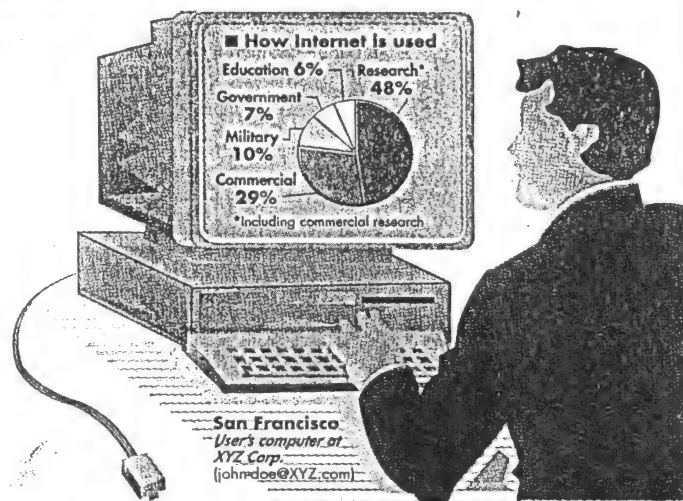
Explosive growth

The number of host computers on the Internet has doubled since January 1992. A single host computer may support hundreds of individual users. There are an estimated 15 million users of Internet.



Source: SRI International

CHRONICLE GRAPHIC



The mother of all networks

With 1.5 million computers and their interconnections, the Internet is the world's largest, fastest-growing network. Once primarily a government and research network, it is seeing expansive growth in commercial use.

At a computer terminal hooked into the net, a user can skip across continents and control computers at remote sites, send and receive electronic mail and search far-flung databases and archives. Here is an example of how a user might use the Internet. (Electronic commands and addresses to access these services are in parentheses.)

Software

User downloads public-domain software from computer at Stanford University. (ftp.sume.aim.stanford.edu)

News

User logs on to FDA bulletin board to read latest AIDS news. (telnet fdabbs.fda.gov)

Libraries

User searches Library of Congress database. (telnet dlcd.com)

Electronic mail

User sends e-mail message to Internet White House. (whitehouse.gov)

BACKBONE NETWORK

High-speed national network. Originally established and financed by the U.S. government to link five supercomputer centers.

Archives

User logs on to National Science Center to download data from satellite sensors. (telnet nasdaq.gis.nasa.gov)

Source: Internet Society; "The Whole Internet," Ed Krol; "Surfing the Internet," Jean Armour Polly

GRAPHICS BY STEVE KEARSELEY/THE CHRONICLE

INTERNET: Growing Exponentially

From Page C1

our employees found they couldn't live without it," said Peter Ho, network systems engineer. "A lot of our users would kill me if I took it out."

Use of the high-speed (45-megabit-per-second) backbone of the network is free, because it is fully subsidized by the U.S. government. Users pay for access to the other, privately operated computer networks tied to the backbone.

Unocal pays about \$10,000 per year for access to the 1.5-megabit-per-second CERFnet regional network and \$2,500 per month for a leased telephone line that can move data at 56 kilobits per second.

Individuals with a personal computer and modem — used to transmit and receive data over phone lines — can also use the Internet, and for a much more modest price. They pay less because they use less bandwidth — which means their messages move at slower speeds. Access to the Internet through commercial service providers costs as little as \$6 per month plus \$2 per hour.

Many people who have access may not realize it. Most universities provide free Internet access to every student, and many electronic bulletin-board services, such as CompuServe and MCI Mail, provide a gateway for exchange of electronic mail with Internet users throughout the world. These services do not allow use of all of Internet's features — for example, a huge number of databases.

Novice users find navigating the ether a daunting experience. While some of Internet's features are user-friendly, with whimsical names like "Gopher" (a menu-based system for retrieving information), "Archie" (for locating

tray advisory body is likely to recommend that in 10 years, every central government office worker should have a personal computer on his desk, a ministry official said. The subcommittee's report is due this month.

Presently, there is only one PC for every 36 officials in central government.

Greater Use of PCs Urged in Japan

Tokyo

Japan should dramatically increase the number of personal computers in Japanese homes, government offices and schools as part of a 10-year plan to embrace the computer age, a government official said.

A subcommittee of a Ministry of International Trade and Indus-

GETTING AROUND THE INTERNET

The Internet has become such a labyrinthine jumble of networks that software tools to locate information are essential. Some of the more widely used tools, and how they could be compared to similar services on the telephone system:

ARCHIE

Created by two Montreal graduate students, Archie searches public archives, telling you all the different places on the Internet where the files you seek can be found.



Telephone analogy: Operator assistance

GOPHER

Developed at the University of Minnesota, this program uses menus (lists of choices) to browse through available information and transfer it to your own computer.



Telephone analogy: Yellow pages

WALS

The Wide Area Information Server, developed in a joint project by companies including Apple Computer and Dow Jones, lets you search many databases by asking questions. A popular tool for "publishing" databases on the Internet, the program responds to your questions with a list of possible choices. The program can then be re-run at regular intervals, creating a sort of personal electronic newspaper.



Telephone analogy: Operator assistance, but smarter than Archie or Veronica

VERONICA

There are now so many Gophers on the Internet that people are having a hard time finding the information they need. Veronica, developed at the University of Nevada in Reno, is an example of how new tools develop from older ideas. Like Archie, it collects all the words in the Gopher menu lists. Like WALS, Veronica builds a database that can be searched with simple questions. It then builds a menu list of choices.



Telephone analogy: Operator assistance

WORLDWIDE WEB

Hypertext is the ability to link words, pictures, and ideas with other ideas, pictures and words. Designed by a programmer at the European Laboratory for Particle Physics in Switzerland, Worldwide Web (WWW), lets you navigate through linked information sources around the Internet. This can be done in a windows environment by clicking with a mouse on words or other "buttons."



Telephone analogy: Call forwarding

Source: Clearinghouse for Networked Information Discovery and Retrieval

ASSOCIATED PRESS GRAPHIC

they do not collectively connect — burn, executive director of Commercial Internet Exchange, one of every Internet user to every other. "If you want to have full connectivity" — allowing any computer on the Internet to talk to any other, anywhere in the world — "one of two things is going to have to happen soon," said Bill Wash-

Game's Afoot on Internet

BY JOHN ECKHOUSE
Chronicle Staff Writer

To learn about Internet, join the hunt.

Launched last fall by Rick Gates, a librarian at the University of California at Santa Barbara, the Internet Hunt teaches people how to blaze a trail through the vast and varied forests of information available — some might say hidden — on the network.

Players from all over the world eagerly await each month's electronic posting of 10 trivia questions. The rules specify that contestants get their answers exclusively from the enormous resources available on the Internet. There are no prizes — just plenty of fun.

Taking part in the hunt — or just perusing the questions — allows one to appreciate how much information is available on line through this mother of all computer networks. Hunters have rummaged through the net to come up with answers to such queries as:

■ Who is the author of the only book held by Victoria University of Wellington on the training of sheep dogs?

■ How does one say "Merry Christmas and a Happy New Year" in the Czech language?

■ When does the fisheries-research ship Kaiyo Maru return to Tokyo from the Bering Sea?

■ Where can one find a good layman's description of colon cancer, along with details of the kinds of treatments available?

■ Where can one find a list of computer jobs available near the University of North Carolina?

In submitting the answers, contestants must explain how they obtained the information. They must include the often-arcane computer commands they used. The answers, which are made available to all network users, help novices learn to navigate the vast network.

Internet Becomes Road More Traveled As E-Mail Users Discover No Usage Fees

By STEVE STECKLOW

Staff Reporter of THE WALL STREET JOURNAL

Bob Nick used to spend hours reading and posting messages on Prodigy Services Co.'s on-line computer service, all at a cost of \$14.95 a month. But in July, Prodigy started charging by the hour, and Mr. Nick realized his monthly bill could jump to \$300.

So the electrical engineer, who works for Sparta Inc. in Huntsville, Ala., switched from Prodigy to the Internet, the global network of independent computer networks.

Now Mr. Nick exchanges and reads as many electronic messages as he wishes and doesn't worry about the bill, since there is no per-message fee. He gains access to the Internet through Sparta, which pays a flat annual fee of \$10,000 for its 650 employees. "Basically, since there's really no cost to it, I really like it," he says.

Mr. Nick discovered what millions of Internet users already know—once connected to the information pathway, there are no additional charges. Not surprisingly, with the Internet growing rapidly—traffic is rising as much as 15% a month—its no-usage-fee policy is beginning to cause concern among commercial on-line services, such as Prodigy and Compuserve, and electronic mail providers, including MCIMail, Sprint Corp.'s SprintMail and American Telephone & Telegraph Co.'s EasyLink Services.

New Way of Doing Business'

"I'm not sure threat is exactly the right word, but if you ignore it, you do so at your own peril," warns Norman deCarteret, senior systems analyst at Advantis, which like Prodigy is owned jointly by International Business Machines

Corp. and Sears, Roebuck & Co. Advantis sells its own electronic mail service, Mail Exchange, and another service that links companies to the Internet. Mr. deCarteret says the Internet "is going to force a new way of doing business on some people."

There were an estimated 4,750,000 subscribers of commercial e-mail and on-line services at the end of 1992, according to Electronic Mail & Micro Systems, an industry newsletter. Prodigy claims to be the most popular on-line service; nobody is certain which electronic mail provider is number one since figures are not made public.

The Internet, of course, isn't totally free. Universities, research institutions and corporations all pay to hook their computer networks directly into it. Corporations pay about \$1,000 a month on average to give employees—typically those in research and development—unlimited Internet access via a dedicated data line. Once connected, however, employees can use the Internet at no extra cost in virtually unlimited fashion—for business or personal purposes. And while most of the Internet is notoriously difficult to use, its electronic messaging system is relatively user-friendly.

The Internet is a free-wheeling, global network of more than 34,000 smaller computer networks, public and private. It works like a nonprofit food co-op; it has no owner, is managed by vol-

unteers and derives operating costs from its members, who pay connection fees to large regional computer hubs that direct the system's traffic or to local-access providers that tie into the hubs. The federal government, which started the Internet in 1973, still subsidizes it.

Although IBM sells computer communication services through Prodigy and Advantis, 36,000 of its workers use the Internet to communicate with customers and each other, at a monthly cost of about \$80,000, less than \$3 per user. Indeed, Prodigy and other on-line services are making the Internet even more attractive by connecting their webs to it with electronic "gateways." Through these gateways, Internet users pay nothing to reach people who subscribe to commercial services, while

some of the subscribers to those services have to pay to reply—or to reach each other.

"It's cheaper than phone, it's cheaper than fax, it's even cheaper when you take into consideration all the cost of having your secretary type a letter for you," says Howard Funk, acting executive director of the Internet Society, a group that promotes the service.

Dial-Up Access Offered

A burgeoning cottage industry of companies is now offering businesses and individuals dial-up Internet access, either on a monthly basis or by the hour. This access is slower than a dedicated line, but less costly. Software Tool & Die Inc., of Brookline, Mass., charges its 5,000 customers as little as \$1 an hour for Internet access—vs. \$2 to \$22.80 per hour on commercial services—and is signing up about 150 new, Boston-area customers a month. "I would say 60% of our customers come from

Compuserve, Prodigy, MCIMail, AT&T Mail and America On-line," says Mary Riendeau, vice president of information services.

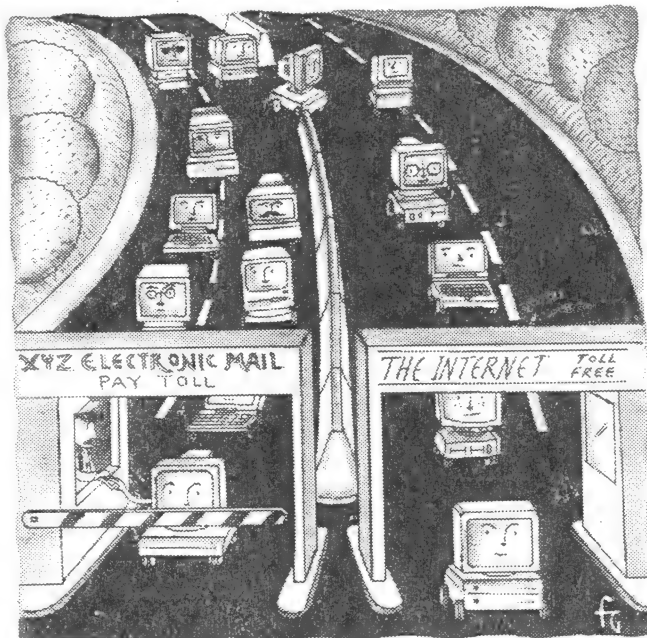
Internet access also is available through some on-line services such as Delphi, which just yesterday agreed to be acquired by News Corp. That service, which will be known as Delphi Internet Services Inc., also charges as little as \$1 an hour.

Nelia Lyda, a medical technologist from Scotts Valley, Calif., said she switched to the Internet after four years on Prodigy to save money. She pays \$17.50 a month for unlimited Internet access through Netcom On-Line Communication Services Inc., of San Jose, Calif.

"I think it's a terrific deal for that amount of money," Ms. Lyda says. "I can e-mail the president if I want to. I can download files at no extra charge from say, Colorado. And there's no limit on messages." Ms. Lyda sent as many as 100 messages a month on Prodigy, which charged her 25 cents each after the first 30. Now she sends about 600 messages a month with no extra charge.

The for-profit services say that they don't view the Internet—which is growing faster than they are—as a direct competitor and that they haven't lost many customers to it. On-line services

Please Turn to Page B6, Column 4



Felipe Galindo

Electronic-Mail Users Find Internet Offers Cheaper Alternative

Continued From Page B1

say, they are easier to use and offer different services, such as airline reservations and stock quotes. And unlike the Internet, the major commercial services feature colorful, graphic interfaces with easy access to "help" screens.

"Everyone wants to jump on this price issue," says Dave Bezaire, senior product manager at Compuserve Inc., a unit of H&R Block Inc. "The reality is accessibility, ease of use, customer service and world-wide access."

"If anything, the Internet is going to help us," adds Brian Ek, communications manager for Prodigy. "With every bit of publicity and every bit of usage that the Internet gets, it raises public awareness of on-line communications in general."

Electronic mail services say they provide more confidentiality than the Internet and other features such as guaranteed delivery and message tracking. But some industry observers believe e-mail providers are vulnerable. "Some customers may drift over to the Internet side if they're primarily sensitive to price," says Dan Blum, a Takoma Park, Md., consultant for Rapport Communications, an e-mail adviser.

Some e-mail services already are under pressure from businesses to lower prices. Traditionally, e-mail services charge customers by the size of the messages they send, measured in characters. But with the advent of multimedia, in which combinations of text, voice, video and graphics can be sent via computers and phones, messages are starting to mushroom in size. Customers are beginning to ask for flat-rate pricing with unlimited messaging.

More Internet mail is coming in than going out of the gateways, which may force for-profit services to stop free messages from the Internet. MCI Communications Corp. says it has no such plans, but AT&T EasyLink says it is reviewing its Internet policy. Compuserve, meanwhile, has been charging customers to receive Internet mail since 1989 and now flags each message with a "postage-due" tag. Prodigy says it will offer access to Internet messaging this fall, using Compuserve's approach.

But Prodigy has put off its Internet gateway for about a year. The company says the delay is unrelated to pricing, but one former employee says Prodigy officials were worried that providing Internet access might prompt some subscribers to switch services.

Why World Is Looking To Internet

By Don Clark
Chronicle Staff Writer

With users now tapping in from 137 countries, the mother of all computer networks is suddenly looking like a major force in global economic development.

About 900 representatives from 90 of those nations are gathered this week in San Francisco to celebrate the information web known as Internet. Though born out of Pentagon research and still partly subsidized by the U.S. government, some 40 percent of this network of networks is now located outside the United States.

Users from such countries as Chile and Croatia, like their American counterparts, are using desktop computers linked by Internet to exchange electronic

from Page B1

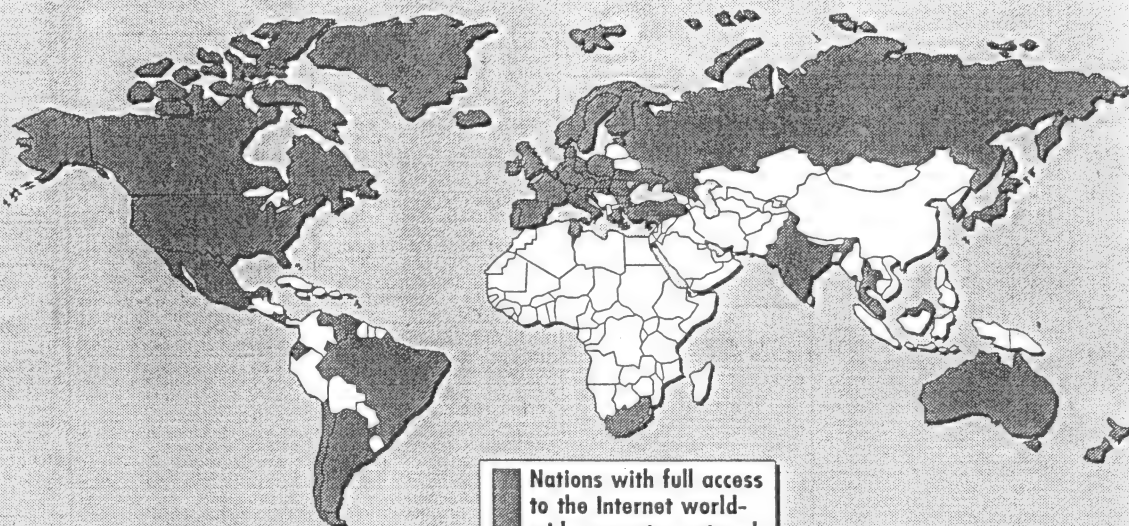
Internet may run out of computerized addresses for those host machines in seven or eight years. Attendees at the INET conference are debating changes in technical standards, software and hardware to accommodate the explosion.

"We are in a rocket taking off and we have to change the engine in flight," said Vinton Cerf, president of the Internet Society.

Internet's growth is being widely studied as a model for how communications technology can make countries more competitive. The Clinton administration, promoting a concept called the National Information Infrastructure, has long advocated an upgrade of America's communications networks so that they can efficiently carry complex images and full-motion video for use in fields such as medicine and education.

In Silicon Valley, a public-private partnership called Smart Valley is studying how communications can make the region more competitive. 3Com Corp., Silicon Graphics and Tandem Computers, for example, next month will begin an ambitious test of new technologies for telecommuting — letting 500 or so of their employees stay home rather than clogging the freeways.

IT'S A WIRED WORLD



Source: Larry Landweber and the Internet Society

Nations with full access
to the Internet world-
wide computer network

CHRONICLE GRAPHIC

mail, swap programs and data, and pour through vast databases of academic and commercial information. The non-U.S. percentage should grow to more than half by October 1994, according to the Internet Society, the non-profit group hosting the INET '93 conference.

"Everybody understands now

John Young, retired chief executive of Hewlett-Packard Co., in a keynote address at INET, argued such tests are crucial because private companies must fund the new networks by developing commercially viable products and services.

"The National Information Infrastructure is not about networks, it's about real values to real people," Young said.

The value to users was apparent at INET. About 60 computers and terminals were packed into a room at the Hyatt Regency Embarcadero to allow conference attendees to check their electronic mail or carry out other work on the network. A newer technology allowed

that better communications is a key part of development," said Lawrence Landweber, a University of Wisconsin professor who has studied the growth of the network.

Internet allows data to move from one network to another, much as a letter moves from city to city. The number of host com-

puters, each capable of serving mini-network, is growing at more than 7 percent per month and totaled 1.7 million as of July, the society estimates. Assuming about 10 users per host, the total number of users is 17 million.

At current growth rates, In

INTERNET: Page B3 Col. 1

live video coverage of the event to be distributed over Internet.

Internet is a particularly hot topic in the former Soviet Union, whose countries sent 21 representatives to INET. In Croatia international data connections are reaching 7,000 researchers at 100 institutions, according to a paper delivered at the conference.

But many countries are struggling with technical and financial problems. Much of Africa is still not connected to the network. Chile has had two major connections to Internet since January 1992, but two scientific networks are still not connected because of political disagreements, according to another conference paper.

BUSINESS

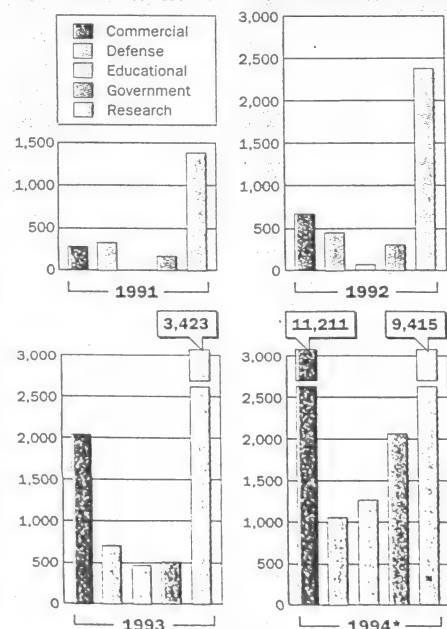
Los Angeles Times

Internet at a Glance

A network of computer networks, the Internet was born as a U.S. military research web and now spans the globe, allowing 15 million users to exchange electronic mail, confer with others who share special interests and navigate an ocean of on-line data. Lately, the complexion of the net is changing as more and more businesses use it. Nobody owns the Internet; it's governed by the volunteer Internet Society in Reston, Va.

Commercial Usage

The vast majority of networks joining the Internet will carry business communications, the fastest-growing part of the system.



Figures as of March each year

*Projected

WIRED

Businesses Create Cyberspace Land Rush on the Internet

By CARLA LAZZARESCHI
TIMES STAFF WRITER

So what if it lacks the cachet of 90210? Who cares that the neighborhood is still full of nerds? An address on the Internet is the latest gotta-have status symbol in corporate America.

Once the hidden preserve of academics, scientists and defense contractors, the Internet—that grand global network of computer networks—is now the site of a cyberspace land rush, with businesses pouring onto the system in something resembling a digital stampede.

In the process, the computing world's closest approximation of a countercultural stomping ground is being transformed into an adjunct to corporate America's cash register—much to the displeasure of many longtime users.

Thanks mostly to businesses, a system that already reaches 15 million people worldwide is growing at the rate of perhaps a million a month. An estimated 6,500 U.S. firms, including more than half the Fortune 1000, subscribe to telecommunications services that give them an Internet mail drop, and more companies are gaining full-blown access all the time.

From Sterling, La., Argus Chemical relies on the Internet instead of Federal Express to disseminate up-to-the-minute results of important research tests throughout its organization. The Internet, after all, is available 24 hours a day every day.

From Los Angeles, Unocal uses the Internet to transmit to remote locations any maps and land surveys needed for its oil and gas exploration. Why? The Internet spans the globe, reaching nearly 130 countries.

From New York, McGraw-Hill is trying the system to deliver some of its newsletters and magazines. At least a dozen other book publishers are openly advertising and taking orders via the Internet.

Even cable television operators, led by Tele-Communications Inc. and Time-Warner Corp., are exploring ways to

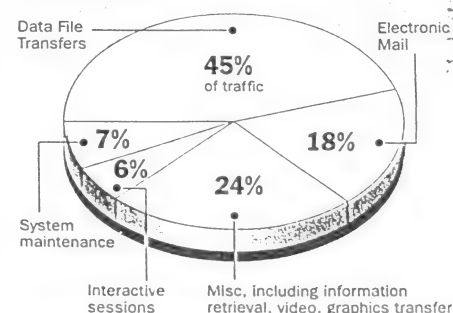
Please see INTERNET, D2

Top Commercial Users:

Number of computers connected, as of March 31

Hewlett-Packard	132,243
McDonnell Douglas	11,800
Bell Comm. Research Corp.	5,400
Harris Corp.	4,800
TRW	4,600
Genentech	4,200
Amdahl	4,100
Xerox	4,100
Mitre Corp.	3,900
Honeywell	3,400
Dell Computer	3,400

How do Corporate Customers Use the Internet?



INTERNET: Businesses Stampede to Get Corporate

Continued from D1

offer their subscribers access to the Internet via the living room TV set.

Businesses would be pouring on to the Internet even faster if it weren't for worries about security. Nonetheless, the rush for Internet access has been so great in recent months that some companies, including Miller Brewing Co. and retailer Nordstrom Inc., have reserved Internet addresses for potential future use.

"Remember when a fax machine seemed an option? Now everyone has one. The same holds true today for a corporate Internet address," says Christopher Locke, a software engineer and former editor of the *Internet Business Journal*. "Companies that have no presence in this new arena will quickly fade from view."

That may be hyperbole, but there's no denying the growing importance of the Internet or the broad implications of its rising use. For any user with a personal computer and a modem, the Internet offers cheap, instant global communications.

You can use it to send a fax to Finland or locate the works of Shakespeare. You can talk to fellow orchid fanciers, find a fiancée or publish your memoirs. There are perhaps 4,500 special-interest conferences—from autos to Unix, Anne Rice to Elvis. Electronic mail on the Internet can be had for less than \$10 a month through a commercial service. Individuals can get access to the whole shebang for

less than \$20.

Businesses, by contrast, pay from \$1,000 to upward of \$300,000 a year, depending on their type of connection and what services they consume.

Navigating the system isn't easy. Written by the computer literate for their own ilk, the required sequences of keyboard entries are arcane and difficult. As a result, the Internet long remained out of the reach of the uninitiated.

But over the last three years, a few entrepreneurs have gone into the business of making it easier for firms and individuals to connect to and find their way around the system. Businesses, many of them by now loaded with university graduates who were issued Internet addresses with their student cards in the 1980s, have responded enthusiastically.

"The Internet is still a long ways from being a resource for the masses," says Vinton Cerf, the preeminent computer scientist credited with developing the Internet's unique technology. "But it still is the closest thing we have to an advanced, public data network."

Indeed, the Internet is a prototype of the so-called information highway touted by two of its more recent subscribers: President Clinton and Vice President Al Gore.

A 1960s-style cooperative of computers, software and telephone wires, the Internet was started by the Pentagon's Advanced Research Projects Agency to link the

Defense Department with its suppliers across the nation. Over the years, the network grew to include universities and laboratories around the world.

Like the long-distance phone network created by AT&T at the turn of the century to tie together tiny phone companies, the critical link uniting Internet members is a common telecommunications software that bridges what would otherwise be incompatible systems. Anyone using that software gains access to the Internet.

Because it's a network of some 12,000 smaller networks, no one owns the overall Internet. And no one really runs it—although the system is administered, in a way, by the volunteer Internet Society, based in Reston, Va. Order is maintained by local network administrators, who cooperate with one another because they benefit by doing so.

So the Net exists in a state of suspended anarchy to serve subscribers who have resisted attempts over the years to impose stricter controls on it.

From its earliest days, no idea or creation has been deemed too outlandish or extreme to be denied access. As a result, the Net has attracted an eclectic community of subscribers whose interests and pursuits range from cutting-edge medicine to pornography, from nuclear arms to cartoons, from the latest stock market maneuverings to the hottest nightclub in New York.

Address on Global Information Highway

Along the way, the Internet has developed what has been described as a "culture of remote intimacy," with users employing the system to share work with far-flung colleagues and on-line discussion groups chatting electronically about a mind-boggling array of subjects.

But with the stampede of corporate America, that culture is shifting.

Clashes have erupted between the Net's traditional users—a free-wheeling bunch who built the system based on trust and a mutual interest in research—and businesses, for which the interest is more capitalistic.

To be sure, mundane electronic chitchat still accounts for most of the network's traffic. But business subscribers increasingly turn to the Net to handle some of their most critical corporate communi-

cations.

That the communications are so important points to what is perhaps the largest single concern among corporate users—the security risk posed by connecting their own computers to public data networks.

Using the Internet as an entry point, hackers have roamed through—and sometimes vandalized—corporate databases. Even sophisticated "fire wall" software used to seal off internal company computers from the Internet isn't completely hacker-proof.

Equally vexing is the need to encrypt data transmissions to ensure privacy during their brief electronic journey. That creates some formidable obstacles for multinational companies operating in multiple foreign languages and limited by strict export controls on American encryption technology.

Further, as with any new com-

munications medium, the complex legal and ethical issues surrounding copyright ownership of materials flowing across the Net's networks must be resolved.

Until these thorny problems are settled, some corporations are limiting or barring connections to the Internet.

"Despite its potential to be the premier public long-distance data network, the Internet is still a questionable legal beast," says Eric Fair, who carries the title of postmaster in Apple Computer's engineering division. To protect its own computers, Apple permits only indirect access to the Internet by the bulk of its employees.

Such hurdles aside, the Internet is still considered one of the most successful transfers of technology between the defense establishment and the commercial sector.

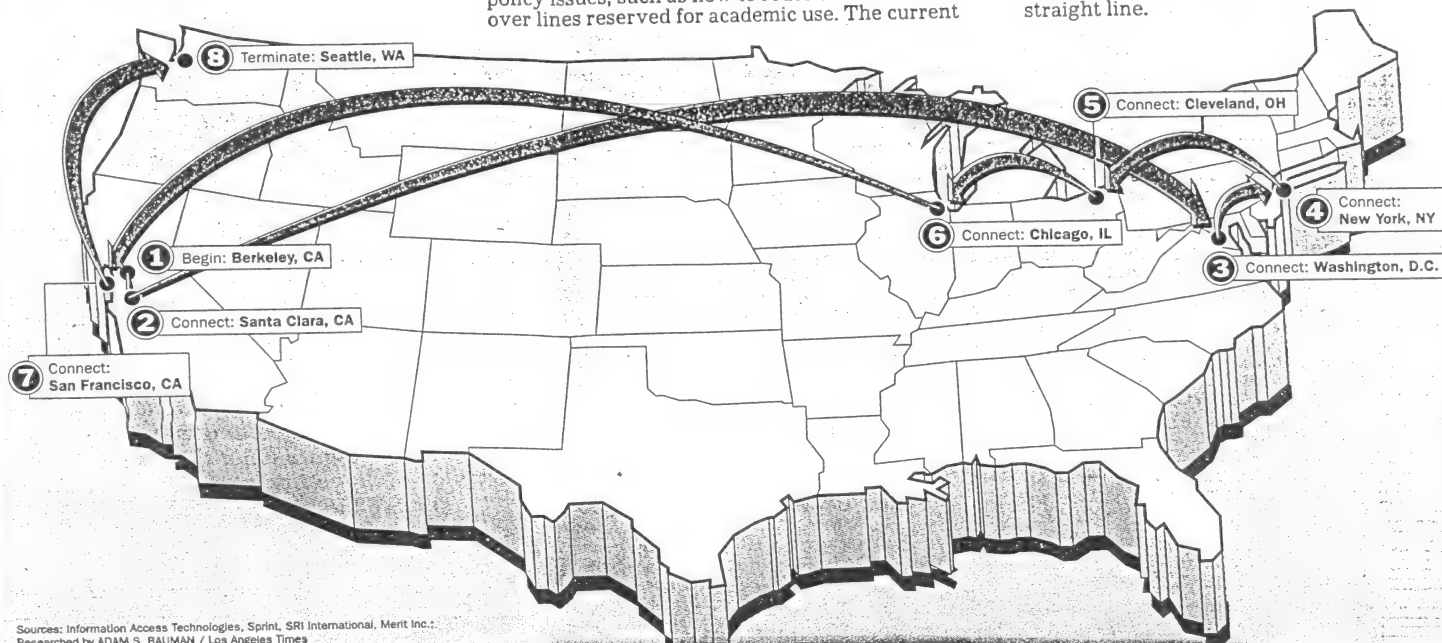
Please see INTERNET, D4

A CIRCUINOUS ROUTE

The backbone of the Internet—the main switching nodes—may in time become the “information superhighway” of the future. But

geographically speaking, the paths over which data travel have become less and less direct. Major Internet service providers need to resolve complex policy issues, such as how to route business data over lines reserved for academic use. The current

network configuration results in curious data routing choices; the shortest distance on the Internet between Berkeley and Seattle, for instance, isn't always a straight line.



Sources: Information Access Technologies, Sprint, SRI International, Merit Inc.;
 Researched by ADAM S. BAUMAN / Los Angeles Times

DELERICH / Los Angeles Times

INTERNET: Firms Rush to Join

Continued from D2

Its wholesale conversion from a government-funded research project to an exclusively commercial service got a big boost in May, when the Clinton Administration proposed phasing out direct government financial support of Internet member networks. Instead, the government would provide funding for universities and other public agencies to use the system.

The proposed changes have sparked fears that the government eventually will eliminate as well its indirect subsidies for public agencies, leaving them potential victims of a pricing scheme geared to providing services to profit-oriented businesses.

"This network has been working perfectly for decades, and now the people who developed it are being ousted *carte blanche*," complains Vigdor Schreiberman, whose newsletters cater to the academic and research communities. "Business people are in business to make a profit, but profits have no place in the business of educating people. Suddenly, the whole purpose of the Internet is inverted."

Commercial access to the Internet is available through any one of the three dozen—and still growing—private companies that have sprung up over the last few years to link businesses to the networks. Service provided by these compa-

nies now accounts for about 30% of all the traffic on the Internet, and commercial traffic represents the fastest-growing segment of network usage.

In addition, individuals can get Internet e-mail by subscribing to an on-line computer service, such as America On-Line or CompuServe. Other services, including the Well in San Francisco and Netcom in San Jose, offer full access to the Internet.

Beyond communications, the Internet is a formidable research tool. Subscribers can simply post questions or calls for help on one or more of hundreds of electronic bulletin boards, often gaining in a matter of hours what would have taken days or weeks to gather by conventional research methods.

The service can prove life-saving, as a Tokyo physician discovered a few years ago when treating a girl with a rare tropical disease. After getting a plea for help from the doctor, the World Health Organization posted an SOS on the Internet's medical bulletin boards. Within hours, says Internet Society Vice President Anthony Rutkowski, the doctor got the responses he needed and cured his patient.

Most queries are less dramatic. Scott Cairns, a New York software engineer, typically uses the

Want to Give Internet a Look-See? Here Are Some Starting Points

With its arcane commands and addresses, the Internet can be daunting to the average person.

But the government, eager to fuel Internet use by businesses and individuals, is offering a new service to help ease the pain. Internic, a collaboration of AT&T's Bell Laboratories in New Jersey, General Atomics in San Diego and Network Solutions Inc. in Herndon, Va., was created this year to help speed Internet use among non-technical subscribers.

If you want to subscribe to the Internet or need help understanding how it works, your first call should be to Internic (800-444-4345). The Internic reference desk offers introductory materials and hints on using the network. It can also refer you to the more than three dozen commercial ser-

vices selling Internet access.

Among those services are:

- **UUNET**, a Virginia-based company, offers businesses leased-line access to the Internet through its Alternet service; 800-488-6383.

- **PSI Net**, also in Virginia, offers leased line Internet access worldwide; 800-827-7482.

- **ANS**. This Michigan company also offers worldwide Internet access; 313-663-7610.

- **Sprintlink**. Sprint, the long-distance telephone carrier, offers worldwide Internet connections; 703-904-2230.

Businesses and individuals in California can also get Internet access through:

- **Netcom**; 408-554-8649
- **Cerinet**; 800-876-2373 or 619-455-3900

- **Barnet**; 415-723-7520

- **The Well**; 415-332-4335

—CARLA LAZZARESCHI

Internet to communicate with clients in England and Japan. But Cairns has been able to indulge his passion for competitive sailing after joining an East Coast crew gathered from Internet subscrib-

ers. And before visiting someplace new, Cairns polls the Net for recommendations on golf courses.

"The advice you get on the Net tends to be pure," he explains. "No one is being paid to say anything."

Under Construction: Information Superhighway

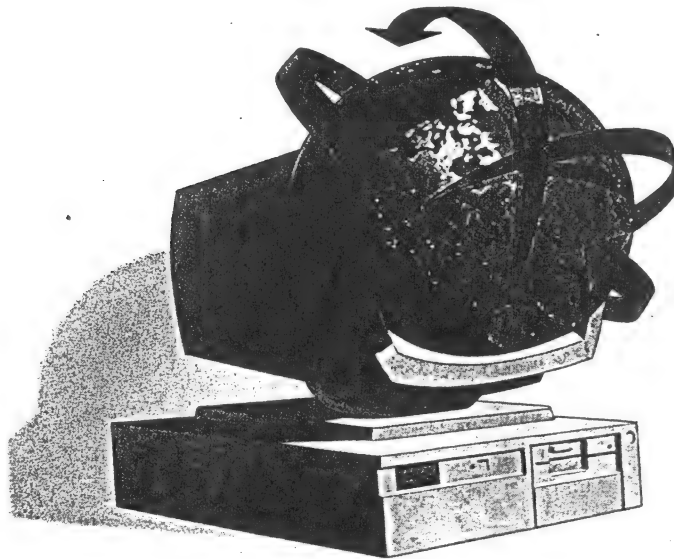
BY DANIEL P. DERN

Internet Will Connect You With Business Colleagues Around the World (for as Little as \$1 an Hour)

When you think about dialing an online service with your modem, you probably think of the big consumer information services, such as America Online, CompuServe, Delphi, GENie, and Prodigy, or the thousands of local bulletin board systems (BBS). But more and more people are talking about Internet, especially after prominent mentions in *Time* magazine and *The New York Times Sunday Magazine*. The Internet now counts more than 10 million users in 50 countries and is spreading like ivy. The number of users has been doubling in recent years.

The Internet, however, is not a commercial information service. It's a collection of more than 11,000 computer networks—from universities, libraries, museums, supercomputer centers, state and federal government institutions, and businesses—around the globe that are linked together. Nor is it a specific entity (although aspects of it are managed by a volunteer organization called the Internet Society)—it's just the name that has been given to this federation of allied networks, many of which are nonprofit. Even if you don't belong to one of these organizations, you can access the Internet and exchange electronic mail and files with others on the system.

The Internet is the closest thing in the



world to the kind of information superhighway that the Clinton Administration has talked about developing. "The government can serve as a catalyst for the private-sector development of an advanced national communications network, which would help companies collaborate on research and design for advanced manufacturing, provide technical information to small businesses, and make telecommunicating much easier," said candidate Bill Clinton last September.

A descendant of a network started by the United States Advanced Research Projects Agency in the late 1960s, Internet was further developed by the National Science Foundation during the mid-1980s. The NSFnet, in fact, is one of the backbone networks on the Internet. Because of these roots and the number of universities connected, Internet is particularly valuable for scientists, academics, policymakers, market researchers, librarians, and technicians, who can keep in touch with their colleagues around the world and up to date with the latest developments in

their fields. Nonetheless, more than half of the groups connected to the Internet are engaged in commercial activity.

Besides this global community of professionals and scientists, the Internet offers some of the same services as commercial networks: electronic mail to Internet users as well as millions of subscribers to commercial services; the ability

to chat/conference with other Internet users; more than two million files and shareware programs to download; multiplayer games; several thousand special-interest groups (called newsgroups) where you can post and read messages; and access to databases (such as the Library of Congress catalog records, transcripts of electronic conferences, census data, and the Department of Commerce's Economic Bulletin Board). You can download files and access many of these services for free.

LOW-COST ELECTRONIC MAIL

Electronic mail is the most commonly used application on the Internet. Nearly one-third of respondents to a recent Internet survey said they carried out some kind of collaborative research or work with colleagues via electronic mail. Many people said they used the Internet e-mail as an inexpensive alternative to overnight mail services. In fact, for many small businesses, the Internet acts as their own corporate network. "We're located all over the

DANIEL P. DERN is editor of the Internet World newsletter and author of *The Internet Guide for New Users* (McGraw-Hill, 1993). Dern can be reached on Internet (DDERN@WORLD.STD.COM) or on MCI Mail as (DANDERN).

ILLUSTRATION BY ERIC BOWMAN

globe—our main developers are in Europe and our leads qualifier is in Montana,” explains Jean Hammond, vice president of marketing at AXON Networks, based in Watertown, Massachusetts. “We use the Internet to transfer work in progress and to communicate via e-mail.”

An Internet user can also exchange electronic mail with members of commercial services, such as America Online, Delphi, CompuServe, and MCI Mail. An Internet user with a commercial account, even on systems such as Dialog and Dow Jones News/Retrieval, can also access that system from the Internet (often at 9600 or 14,400 bps), which may cut phone costs considerably.

INTERNET RESOURCES

- The InterNIC Information Services' Referral Desk ([800] 444-4345), provides a list of groups that offer public access to the Internet; push 1 (registration) at the voice-mail prompt. For help finding general information or a database on the Internet, push 3 (information services).

- Another way to get a list of public-access sites: Send e-mail to the Internet from another service and ask for the PDIAL list, which has information about organizations offering Internet accounts for individuals. Address your message to “info-deli-server@netcom.com” on the Internet and include “Send PDIAL” in the Subject field.

- *The Whole Internet Users Guide and Catalog*, by Ed Krol, is an excellent guide to using the Internet; \$24.95 (O'Reilly & Associates, 1992).

- “Internet Business Pages,” a free service under development, provides a list of businesses on the Internet. Contact Edward Vielmetti, Msen Inc., 628 Brooks, Ann Arbor, MI 48103; (313) 998-4562.

- *The Internet Business Journal* provides ongoing information about business activity and development on the Internet; one year (six regular issues, six supplements) costs \$75, small business rate; Strangelove Press, Ottawa, Ontario, Canada; (613) 747-6106. Also available in some libraries.

- The *Desktop Internet Reference* is a public-domain hypertext guide to using the Internet, which may be freely copied. Requires Windows 3.0 or higher; \$10 for shipping and handling. Contact the author: John Buckman, 3520 Connecticut Ave. NW #33, Washington, DC 20008; (301) 986-0444, ext. 5841 (daytime).

THE DOWNSIDE

Wealth of information and people is one of the Internet's selling points, but it can be a drawback. With millions of megabytes of information to choose from and more than 10 million users, you can easily get lost. That's partly because of the Internet's rather unfriendly and sometimes arcane command-driven interface, in marked contrast to commercial services, which are getting more and more graphic. When sending a message from another system to the Internet, you must use the unfriendly Internet address protocol: *user name-@machine name*. For example, the address for the NSFnet InterNIC's information service is *info@internic.net*. Increasingly, however, Internet sites are offering friendly navigators, which have point-and-click menus in addition to the ability to search indexed lists of resources.

HOW TO JOIN

Because the Internet isn't a commercial enterprise with standardized fees, you can't walk into a store and buy an Internet account. You set up an account with an organization called a Public-Access Internet Site, which is connected to the Internet, then use your own communications software to sign on. Public-Access Internet Sites are popping up in major cities around the world. Even Delphi, a major commercial online service, offers full Internet access. (See “Internet Resources” for more information.)

Most sites charge a mere \$1 an hour to access the Internet, no matter how fast your modem, although you may pay more for some selected databases. Delphi charges \$3 a month in addition to its regular \$10 a month (for four hours' usage) fee. If the public-access phone number isn't in your local calling range, you can expect to spend another \$1 to \$5 per hour in phone costs, and sometimes more for daytime usage. There are also a number of toll-free phone services, which cost as little as \$20 per month, offering e-mail and selected other services.

If your community hangs out on CompuServe, GEnie, or your local BBS, the Internet won't necessarily replace it. But—with a little patience and practice—the Internet can be the doorway to a new universe of information and resources. At the very least, it's a good way to electronically connect disparate people without running up big monthly bills. ■

The National Information Infrastructure

Dr. Vinton G. Cerf (vcerf@cnri.reston.va.us)

The following is the complete written testimony of Dr. Vinton G. Cerf, Vice President, Corporation for National Research Initiatives and President, Internet Society, as given before the US House of Representatives, Committee on Science, Space and Technology; Subcommittee on Technology, Environment and Aviation, March 23, 1993.

Mr. Chairman, distinguished members of the subcommittee and guests, my name is Vinton G. Cerf and I am Vice President of the non-profit Corporation for National Research Initiatives (CNRI). I also have the honor to serve as President of the Internet Society (ISOC), which is a professional society of individuals who are users, developers or operators of the Internet. My remarks today are personal in nature, but they are colored by my past and present professional experiences which form the backdrop against which my opinions and observations have evolved.

I worked on the ARPANET project while a graduate student at UCLA in the early 1970s, helping to develop the protocols used to support communication between the computers (hosts) on the network. The highly successful ARPANET experience with packet switching technology led to additional satellite, mobile radio and local area packet networks, developed under Advanced Research Projects Agency (ARPA) sponsorship and, in the case of Ethernet, at the Palo Alto Research Center of the Xerox Corporation. Dr. Robert Kahn, now the president of CNRI, initiated an ARPA internetting research program to explore techniques to connect different packet networks in such a way that the host computers did not have to know anything about the intermediate networks linking them together. Dr. Kahn and I developed the idea of gateways and wrote the first specification for the basic TCP/IP protocols now used in the Internet.

The idea behind Internet was the seamless linking of many different kinds of packet switched networks. I came to ARPA in 1976 to manage the Internetting research program and by the time I left ARPA in 1982, the TCP/IP protocols

were widely used and the Department of Defense had declared them standards for military use. The Internet has blossomed in the subsequent 10 years, particularly after the National Science Foundation (NSF) introduced the NSFNet as part of the Internet in the mid-1980s. In 1982, there were about 100 computers on the ARPANET and a few score others were part of the NSF-sponsored CSNET which also used the Telenet public data network. In 1993 there are over 1.5 million of them. The system links over 10,000 networks in roughly 50 countries. Although it is not known for certain how many users there are, we believe there are well over 5 million. *The system is tied into most public and many private electronic messaging services and this expands the population able to exchange e-mail to some 15 million.* They include business people, academics, government workers,

scientists, engineers, librarians, school-teachers, astronomers, oceanographers, biologists, historians, reporters, attorneys, home-makers, and secondary school students.

The system is doubling annually in users, networks, hosts and traffic. In some parts of the Internet, such as the NSFNet backbone, traffic growth rates as high as 15% per month have been measured.

Internet is growing faster than any other telecommunications systems ever built, including the telephone network. Today, over half of the networks registered are associated with business users. Of course, these rates of growth cannot continue indefinitely, but there is reason to expect that the user population will exceed 100 million by 1998.

Perhaps even more important, this federal investment in research has created new industries revolving at first around the hardware and software of Internet technology, and more recently, around network and information services supported by the Internet. The new businesses (such as Sun Microsystems, 3COM and Cisco Systems) have highly positive international trade balances and phenomenal growth, commensurate with the rapid growth of the Internet itself. The growth rate is extremely strong in Europe, South America and the Pacific Rim creating major export markets for the US firms offering Internet products and services.

Today, over half of the networks registered are associated with business users ... there is reason to expect that the user population will exceed 100 million by 1998.

In 1975, operational management of the ARPANET was transferred to the Defense Communication Agency (now the Defense Information Systems Agency - DISA). In the mid-80s, the National Science Foundation (NSF), the Department of Energy (DOE), and the National Aeronautics and Space Administration (NASA) joined in supporting the evolution of the Internet and developing and applying its technologies. In addition to developing their own networks (that became integral components of the Internet), these agencies participated in the development and standardization of the Internet protocols (TCP/IP Protocol Suite) and provided support to the secretariats of the Internet Architecture Board (IAB) and Internet Engineering and Research Task Forces (IETF and IRTF). This included support for the Internet Assigned Number Authority (IANA), document editor (RFC Editor), and Network Information Centers which provide information and assistance to users and deal with Internet network address assignments. ARPA, NSF, DISA, DOE and NASA now make up part of the Federal Networking Council which continues to oversee the development of networks used in government-sponsored research and education.

Formed at the beginning of 1992, the non-profit, professional membership Internet Society provides an institutional framework for carrying out a variety of activities intended to foster the continued growth, evolution and application of the Internet. Included in this undertaking is the responsibility for the technical standards used in the Internet. Along with members of the Federal Networking Council, the Internet Society supports the IETF Secretariat. It sponsors conferences and workshops on the Internet and its technology, is establishing liaison relationships with the International Telecommunication Union (ITU) and Organization for International Standardization (ISO), works with various United Nations agencies (e.g. UN Development Program) to encourage the acquisition and use of Internet facilities in technologically-emerging countries, and participates in efforts to extend Internet services from university and research library communities to secondary school systems.

The Internet Society does not operate any of the thousands of networks that make up the Internet, but it assists service providers by providing information to prospective users and involves product developers and researchers in the evolution of Internet technical standards. Corporate and individual, professional support for this organization is widespread and international in scope.

High Performance Computing and Communication

The High Performance Computing Act (HPC) was signed into law late in 1991. The original impetus for this legislation came from then-Senator and now-Vice President Gore whose vision of information superhighways outlined the potential of a computing and communications infrastructure which would

permeate and stimulate the government, business and private sectors of the US economy. The promise of a vast new economic engine equal to or larger than the engine sparked by the National Highway Act of 1956 was a powerful incentive for this bill and lies at the heart of the motivation for creating a new National Information Infrastructure.

One of the key elements of the HPC initiative is its National Research and Education Network (NREN) program. Designed to extend the performance envelope of networking into billion bit per second (gigabit) territory and to extend the scope of access to a larger segment of the research and education communities, the effort spawned a major research program on gigabit networking.

ARPA and NSF jointly funded an effort, organized by the Corporation for National Research Initiatives, to establish multiple gigabit testbeds across the United States. The program is highly leveraged, involving major contributions from the computing and communications industries as well as several of the national laboratories and major research universities. An important focus of the gigabit testbed program is to discover by experimentation which technologies and applications are likely to form the core of the high performance communication systems of the future. The deep involvement of industry is intended, in part, to assure that the results take into account the plans and capabilities of the private sector. Such partnerships among government, industry and academic institutions form a bedrock upon which new national infrastructure can be founded. The vision of the NREN component of the HPC effort begins with the existing US component of the global Internet. Under the NREN program, key parts of the US Internet have been extended to operate at 45 million bits per second (in particular the NSFNet) and procurement of higher speed services by DOE and NASA is in progress. The gigabit testbed program is enabling the early availability of very high speed network technology and the results of the program will help to determine the architecture and technology of even higher capacity services. The NSFNet initiative, which began in 1986, has also led to the creation of dozens of new Internet service providers, including a number of for-profit networks offering unrestricted Internet service to all who desire it.

Another fundamental motivation for the high performance networking component of HPC is the intense investment by the principal interexchange and local exchange telecommunications carriers in the US in the use of optical fiber in their networks. Capable of supporting operation in the billions of bits per second, the optical networks form the strands from which a national gigabit fabric can be woven. Investments by local exchange carriers and cable companies to increase the capacity of the lines reaching business and residential customers make it possible to envision a time when very high capacity services can be supported on an end-to-end basis. The far-sighted vision of the HPC effort, together with the explosive growth of the Internet and basic communications facilities resulting from private sector initiatives, have set the stage for a dramatic new step in the evolution and conver-

gence of computing and communication: the creation of a National Information Infrastructure.

INFORMATION INFRASTRUCTURE

Information Infrastructure is the "common ground" on which computer-based products and services depend to achieve commonality and interoperability. Included in infrastructure are technical standards and the organizations and procedures through which they are developed; communication services and the physical, human and organizational resources needed to deploy, maintain and operate them; legal and regulatory frameworks which encourage cooperative development of precompetitive technology, foster the protection of computer-accessible intellectual property, the protection of privacy, and support the conduct of electronic commerce; widely available computer software for many hardware and operating system platforms establishing ubiquitous and interoperable computing environments in which applications can be embedded. Infrastructure supplies the raw material out of which limitless applications may be constructed.

Some of the characteristics which mark elements of infrastructure include: ubiquity, expandable capacity, simplicity of use, applicability to many uses and broad affordability. A functioning information infrastructure will lower technical and economic barriers to the introduction of computer-based products and services. It will simplify the discovery and ordering of products and services as well as billing for their use or acquisition. It will also facilitate the day-to-day operation of businesses, government, education, health care and all the myriad activities that rely increasingly on the use of computer and communication technology to accomplish their objectives.

Infrastructure has an enabling character. The highway system enabled the suburban housing boom and convenient, door to door delivery of goods. Of course, it also stimulated the automobile industry and travel. The power generation and distribution system enabled the facile application of fractional horsepower motors and a vast array of other electrical appliances wherever they were needed.

Infrastructure development is almost always preceded by critical inventions which motivate the need for the infrastructure. The light bulb preceded and motivated the need for power generation and distribution. The invention of the internal combustion engine and its application in automobiles motivated the need for better roads, service stations, gasoline refining and distribution. Once the roads were in place, their ubiquity and easy accessibility stimulated the production of a vast array of different vehicles, all designed to conform to certain common constraints (size, height, weight) so as to be usable on most of the roads in the system.

The computer is the automobile of the information infrastructure. Laptops are the sports cars; desktops are the sedans; supercomputers are the formula 1 racing engines; and

gigantic mainframe data storage systems are the 18 wheelers. The local access networks form the neighborhood streets; high capacity computer networks are the superhighways; and circuit, cell and packet switching systems form the complex interchanges.

Just as vehicles on the road can be filled with an endless variety of people and products performing a multitude of services, software applications fill the empty computing vessels to create the new products and services of the information infrastructure. Communication protocols and standards form the rules of the road. When traffic jams and accidents occur, we call on emergency services to assist. The same may prove true for the information infrastructure when viruses infect the system or other software and/or hardware failures occur; we will need comparable emergency assistance to restore critical services and functions.

The Electronic Frontier Foundation speaks of computers and computer networking as a frontier in cyberspace. This is an interesting and apt analogy, given the relative immaturity of both technologies. Despite the apparent sophistication of today's computers, networks and software, their application has barely scratched the surface of the latent possibilities. The notion of frontier raises images of boundaries and limits. But cyberspace is a virtual place. It is created out of software, making cyberspace an endlessly expandable environment.

Information is, itself, an infinitely renewable resource to be harvested, shaped, applied and recycled. The products and services which can be built atop the computer and communication infrastructure simply have no logical limits. It is this ceaselessly changing, growing, transmuting information resource which will fuel the economic engine of the information infrastructure.

INFORMATION INFRASTRUCTURE FORMATION

The technical challenges to be overcome in creating a national information infrastructure may only be overshadowed by some of the legal and policy problems. Taking the easier ones, first, it should be apparent that standards for the exchange of a variety of types of information (data) are essential. The value of infrastructure is that providers of two services which must interwork do not have to make bilateral agreements with every partner if appropriate technical standards are developed which enable such interworking. In the case of program (software) interworking, common representations of shared information must be agreed upon so that software developers can be reasonably assured that, if they follow the protocols, their application programs will interwork with each other.

A variety of high and low-level standards are needed for representation of digital documents; information retrieval queries and responses; remote program interactions; financial or other commercial transactions; privacy, integrity and

authenticity preservation; and a plethora of application-specific standards for information interchange. These representations need to include the capability for a wide range of media, including sound and pictures. There are a number of representations available for encoding these various media, but there is not yet widespread agreement on a common set. Consequently, we are still some distance away from a workable information infrastructure.

The applications that can be supported on a suitable information infrastructure are limited only by imagination and creativity. Examples include health care support (e.g., patient information, prescription databases, digitized X-Rays and MRI scans, remote consultation); education (classrooms without walls, using the information infrastructure to receive instruction, explore digital libraries and work with distant partners), manufacturing, provision of government information, and support for electronic commerce (e.g., order entry, electronic or physical delivery of products, electronic payments, product specifications).

An important element of Internet growth is the typical pricing strategy of service providers: flat rates based on the bandwidth of the lines used to access the Internet. Unlike some commercial e-mail and other public data network service providers, Internet service providers have not charged by the "packet." Many believe that this policy has had a major, positive effect on the growth of the network because users had little uncertainty with respect to annual costs for use of the system.

ANECDOTES FROM THE 21ST CENTURY

Those of us who have lived with the Internet since its inception have been living in what will be common in the next century.

In preparation for this testimony, I sent a brief message out on the Internet to hundreds of thousands of people who make daily use of the network. I asked them to offer their thoughts on points they considered important to make. Within hours, I had thousands of responses, not just from domestic sources but from all over the world. Without the infrastructure of the Internet, such a question would not have been worth asking since the answers would have taken far too long to receive, and I could not have applied available computer cycles to sort and sift the resulting responses. My correspondents were almost uniformly enthusiastic about the prospects for national and global information infrastructure. The following were some of the points they made:

□ The Internet Society newsletter is created by correspondents all over the globe who e-mail their stories to the editors in Los Angeles, California and Reston, Virginia. The whole process takes places over a few days, with all the editing taking place on-line. Each issue is available on-line within minutes

of completion through a variety of information services on the Internet.

□ A professor at the University of Southern Louisiana offered to teach a class on Internet use through e-mail on the Internet. 15,000 people applied to take the class! This is distance-learning with clout!!

□ A blind student of Shakespeare asked on the Net, "where can I get on-line copies of the plays, it's the only convenient way for me to read them". He uses a text-to-speech and text-to-Braille device. He got back many pointers to on-line archives around the world.

□ When President Clinton and Vice President Gore were visiting Silicon Graphics in California's Silicon Valley, the audio and video of the speeches were packetized and multicast on the Internet to hundreds of participating sites. This is an example of the nascent potential in combining all forms of communication in computer-mediated form.

□ Internet Talk Radio recently made the front page of the New York Times - it is another example of the convergence of digital computer communications and mass media.

□ When I needed information about the Spratley Islands, I just turned to the CIA World Fact Book made available on the Internet by the University of Minnesota.

□ A technical problem arose with an application running on an Apple Macintosh. The user sent an e-mail message to several distribution lists and news groups and got back helpful responses, some in minutes, from France, Germany, Italy, Australia, India, Singapore, Canada, England, Norway, United States, Finland, ... well, you get the idea. Cyberspace has common interest groups that transcend national boundaries.

□ The city of Wellington, New Zealand, has a computer on the Internet. It has placed there a wide range of information of interest to potential visitors and tourists, local residents, and Internet explorers. There is strong historical evidence that the rich personal interactions that take place on the Internet contribute to a marked increase in face-to-face meetings requiring travel, so the local government is to be commended for its foresight.

IMPORTANT THINGS THE US GOVERNMENT CAN DO

Offered below is a representative set of comments and suggestions received over the course of a few days from the Internet community. Because of its source, it has an obvious Internet bias to it, but despite that, I think these ideas are worthy of serious consideration.

1. Invest in the development of pre-competitive software and technology which is made available to industry for competitive productizing. Historically, universities have de-

veloped sample implementations of new Internet software which is then used as the basis for product and service development in industry. Occasionally, industry will sponsor development of freely available software which can be readily distributed throughout the network, creating a kind of mini-infrastructure on which more elaborate, for-profit products and services may be based. In both cases, new businesses are often created to service the market created.

2. Foster and facilitate the development of technical information standards through cooperative efforts among industry, academia and government. The procedures of the Internet Engineering Task Force are a model for expeditious and effective development because the standards must be implemented by multiple parties and shown to interoperate before they are eligible for standardization.

3. Revisit COCOM and US-specific policy on the application, use, and export of the RSA and DES cryptographic technology. Present policies inhibit the creation of particular aspects of global information infrastructure and, in some cases, US companies are placed at a severe disadvantage relative to competitors. These technologies are key elements [no pun intended] in solving problems of intellectual property protection and management and electronic commerce in an on-line environment.

4. Adopt the TCP/IP protocols as coequal with the OSI protocols in the US GOSIP specifications (which describe the profile of protocols that are recommended for use in Government procurements). The TCP/IP protocols are already in wide-spread use within the government, so this change would merely acknowledge reality.

5. Move aggressively to support library access to Internet services, with particular attention to rural community access.

6. Institute training programs to educate the nation's secondary school teachers and support staff on the use of computer and communication technology in the classroom. Subsidize access where this is necessary. Involve state educational infrastructure in this effort. Review highly successful state-level programs as input to national policy development.

7. Stimulate the development of quality software for use in curricula at all levels. Consider programs to develop pre-production software and make it available at no charge, leveraging the creativity of national laboratories, universities and individuals.

8. Mandate public, on-line availability of government-produced or sponsored information and allow the private sector to add value and resell it. For example, the White House is providing on-line access to unclassified executive orders and text of speeches by senior administration officials within hours (and sometimes minutes) of their release.

9. Foster programs to explore and experiment with the use of information infrastructure to support telecommuting. Not only as an energy-saving, pollution-reducing step, but a major tool for implementing the Americans with Disabilities Act provisions. It was noted that home-employment and suburban satellite offices illustrate that electronic communication

infrastructure is approaching the importance of the more concrete (pun intended) traffic highways.

10. Make use of the Internet to harvest information from its tens of thousands of public databases as an adjunct to intelligence gathering and analysis by various agencies of the federal government. Make available government unclassified information and analysis via the Internet as a contribution to the community (e.g. CIA World Fact Book).

11. Get all branches of the government on electronic mail and support the ability to exchange e-mail with the public.

12. Encourage the deployment of ISDN services.

13 Foster the development of shared scientific databases and collaboration tools which can be used to enhance the utility of research results and provide access to raw as well as analyzed data to support corroborating research.

14. Make use of the Internet to build bridges among the scientific, research, academic and educational communities.

15. Link the museums of the world on the Internet.

16. Avoid the unintentional creation of a gap between information rich and poor. The concern here is that private sector entrepreneurship may conflict with freedom of access to public information. Note that the potential gap problem applies equally as well to individuals and to large and small corporations!

17. Position national policy so that the government need not subsidize network service providers. Rather, subsidize users, where this is appropriate. By this means, remove most of the Appropriate Use Policy dilemmas from consideration at the network level. It is not technically possible today, using existing capabilities, to distinguish different classes of traffic at the network level. [There were a few people who thought the government should build the National Information Infrastructure but the vast majority who commented on this preferred private sector service provision, albeit under government policies which assure ubiquity of service, full interconnection of all service providers and reasonable costs].

18. Find a way to make advertising permissible and useful in the National Information Infrastructure.

Contact information:

Corporation for National Research Initiatives

Tel: (703) 620-8990
vcerf@cnri.reston.va.us

Internet Society

Tel: (703) 648-9888
isoc@isoc.org

The Rise of Commercialization in the Internet

Robert Larribeau, Jr (p00136@psilink.com)

The growth of the Internet

is well documented. In 1992 the number of hosts grew from 750,000 to 1.4 million. The current growth rate for the number of networks connected to the Internet is about 7% per month and about 14% per month for hosts. The backbone traffic at the end of March 1993 was about 5.3 terabytes and increasing about 10% per month. The commercial use of the Internet is an important component of this prodigious growth.

The Internet is a hierarchical network with the NSFNET is at the top. The NSFNET is the backbone that connects separately administered and operated mid-level networks and NSF funded super computer centers. The approximately 35 mid-level networks provide Internet connection services for local academic or commercial networks.

When the Internet was formed by the NSF in 1987, its objective was to provide data services for the research and education communities. The NSF instituted an Acceptable Use Policy (AUP) that limited the use of the NSFNET backbone to research and education purposes. Specifically it says that use "for-profit" and that "extensive use for private or personal business" are unacceptable uses of the Internet. However, the AUP explicitly permits the use of the Internet by for-profit organizations where this use is "covered by the General Principles or as a specifically acceptable use." This opens the door wide enough to allow the engineering departments of many companies to use the Internet, especially those in computer and communications companies. The AUP does not apply to the mid-level networks, which permits the formation of for-profit, commercial mid-level networks.

As the Internet grew, commercial companies started using it more and more. Today more than half the hosts connected to the Internet are said to be in commercial organizations. At first commercial companies accessed the Internet through the existing nonprofit mid-level networks whose primary objective is to serve the research and education community. These mid-level networks were generally organized as nonprofit associations of the academic institutions that they served. Their commercial users are generally offered a lower level of membership than the academic members. These networks typically enforce the NSF AUP on their own network. However the nonprofit mid-level networks still provide Internet access for many commercial companies today.

BIRTH OF COMMERCIAL INTERNET SERVICES

These nonprofit mid-level networks are providing "Commercial use" of the Internet. This is different from the "commercialization" of the Internet. In January 1990 the commercialization of the Internet started when both Performance Systems International (PSI) and UUNET started offering Internet commercial Internet services. PSI and UUNET are for-profit organizations that offer TCP/IP network services and access to the Internet. They do not require conformance to the NSF Acceptable Use Policy on their own networks.

PSI was formed in 1989 as a spin-off from the NYSERNet, a nonprofit academic network based in Syracuse, NY. NYSERNet continues to use PSI as its network service supplier. PSI's network has grown to the point that it now has 51 points of presence in over 40 cities in the U.S. and includes 31 dialup terminal servers. PSI can be contacted at info@psi.com or 1-800-82PSI82.

UUNET began offering UUCP based information services in 1987. It created its AlterNet network in 1990 to provide Internet services. AlterNet currently has twelve backbone nodes located in the U.S. and provides several connections to international Internet networks. UUNET can be contacted at info@uunet.uu.net or 1-800-4UUNET3.

A third network, CERFnet, which provides AUP-free services in California was formed in 1988. It is managed by General Atomics of San Diego, a high-technology research and development company. CERFnet has seven nodes located in both Northern and Southern California. CERFnet can be contacted at help@CERF.net or 1-800-876-CERF.

CHALLENGE: END TO END COMMERCIAL CONNECTIVITY

The first challenge for PSI, UUNET, and CERFnet was to provide an NSF AUP-free path for their customers to communicate with each other. At the time they were formed, PSI, UUNET, and CERFnet were interconnected by the NSFNET backbone. This meant, for example, that a PSI customer communicating with a UUNET customer had to conform to the NSF AUP. These three networks were isolated islands of commercialization that had to be bridged. In March 1991 the

islands were linked by the Commercial Internet Exchange (CIX). The CIX was formed to provide a direct AUP-free interconnection among the three original members: PSI, UUNET, and CERFnet. The membership of CIX has expanded from three members to 12 members today. The CIX members connect directly or indirectly using T1 facilities to a router, called CIX-West located in Santa Clara, CA that is managed on a 24 hours per day, seven days per week basis. CIX-West provides an AUP-free path between the CIX members. CIX can be reached at info@cix.org.

One interesting aspect of the CIX is that there are no settlement fees. Members pay an annual membership fee of \$10,000 and a one-time start-up fee of \$5,000. Each member arranges for its own connection to CIX-West. CIX members do not charge each other for the traffic that they exchange at CIX-West. This is quite unlike the public telephone networks.

Soon after the commercial Internet providers started business a significant event in the development of the Internet occurred. Advanced Network & Service, Inc. (ANS), a not-for-profit company, was formed by IBM, MCI, and Merit, Inc. in September 1990 to implement and operate an upgraded T3 backbone for the NSFNET. ANS quickly became a major factor in development of the Internet and began to take a strong role in the commercialization of the Internet.

ANS formed a wholly owned for-profit subsidiary in May 1991 called ANS CO+RE Systems, Inc. to serve commercial customers and link them to the research and education community. ANS CO+RE provides AUP-free access to the NSFNET T3 backbone for a premium over the price charged to a research and education organization. Net returns from ANS CO+RE are returned to ANS for reinvestment in the network infrastructure.

CIX and ANS CO+RE provide alternative and competing means of providing AUP-free access to the Internet. This competition has created issues that have been difficult to resolve. ANS has recently connected its network to the CIX without becoming a CIX member. This has created routing issues that prevent complete, bi-directional AUP-free communication between customers connected to the CIX and customers connected to ANS CO+RE. As a result both BARnet in California and NEARnet in Massachusetts have subscribed to ANS CO+RE and have become CIX members. Not every Internet provider that serves commercial companies can afford to do this. ANS and the CIX will have to resolve these issues in order for the commercialization of the Internet to reach its full potential. ANS and ANS CO+RE can be contacted at info@ans.net or 1-800-456-8267.

CHALLENGE: PRODUCT & SERVICE DIFFERENTIATION

The commercial Internet providers offer a range of services. Typically they offer full TCP/IP leased-line access at speeds of 56 kbps to full T1 rates. They also offer dialup SLIP or PPP access at speeds up to 14.4 kbps using modems or up to

56 kbps using switched digital services. Asynchronous modem dialup access is offered for PCs using standard terminal emulation software.

These services are quite similar those offered by the nonprofit mid-level networks. The nonprofit mid-level networks typically have low overhead and can set prices very competitively. This can make it difficult for the commercial providers to compete in regions where there are strong regional nonprofit mid-level networks.

The larger commercial Internet providers have several advantages over the academic regionals. They have nationwide networks that offer lower cost toll-free dialing in the important locations around the country. Some of them offer unique connection options. For example, ANS CO+RE offers T3 access for the truly high speed application. PSI offers a frame relay access service at 56 kbps.

The commercial Internet providers offer added value services beyond Internet connectivity. PSI offers Clarinet (clarinet@psi.com), an electronic publishing network service that provides professional news and information, including live UPI wire service news. UUNET offers global networking and archive services for international electronic mail and electronic news with publicly available UNIX software and information.

Network security on the Internet is a major concern for commercial organizations. Both PSI and ANS have come up with solutions that provide security for private network applications of the Internet. PSI uses its frame relay service to define fixed private connections across its own network. The frame relay architecture prevents access from the public Internet.

ANS offers the InterLock service that is a family of application level security services that establishes a barrier between a private IP network and the public Internet. Unauthorized users cannot gain access from the Internet to proprietary data residing on the private network. These services also prevent unauthorized communication from the private network to the Internet. In addition, InterLock services can be used to provide enhanced access control between segments of any given enterprise private network.

By its very nature, network connectivity tends to be a commodity. The non-profit mid-level networks have, on the whole, been able to build and operate networks successfully. The challenge for the commercial providers will be to develop services that differentiate themselves in terms of quality of service, coverage, support, ease of use, and added value services. As they grow and start to compete with the established added value network providers such as CompuServe and Prodigy, the commercial Internet providers will have an even more difficult challenge to face.

CHALLENGE: MANAGING GROWTH

The revenue for commercial Internet providers in 1992 appears to have been about \$15 million. PSI accounted for approximately half this figure. This is an educated guess be-

cause many of the commercial providers are privately held and do not disclose their revenues. This is a significant accomplishment for the third year of operation for these businesses.

The rate growth of the commercial Internet providers will in all likelihood continue or even increase its current high rate. The tremendous growth of the Internet itself will generate significant growth for the commercial Internet providers. The revenue for the commercial Internet providers could reach \$50 million or more by 1995. This growth will create management challenges that will include organization growth, rapid product development, and network expansion. Maintaining the quality of their service and support will become increasingly difficult as these networks grow in size and their customer base expands.

The competitive environment will become more difficult. Some nonprofit mid-level networks, such as JvNCnet in Princeton, NJ (market@jvnc.net or 1-800-35-TIGER), are converting into for-profit commercial operations. The formation of SprintLink by Sprint (1-703-904-2000) and the participation in ANS by MCI are examples of how the telephone carriers are starting to enter the market. Pacific Bell and other RBOCs seem to be looking at the developments in the Internet and its conversion to the NREN with great interest. Everybody is wondering when and how AT&T will enter the market.

The current commercial Internet providers will need to develop strong marketing strategies and programs to support their growth. They need to differentiate themselves from their current and future competitors. Even more importantly they must define a strong market position for themselves and for the Internet to continue their growth in the long term. There are still too many people who really do not know what the Internet is or how they can connect to it, even among sophisticated users.

Accomplishing all this will not be easy. The current revenue levels probably do not generate enough profits to finance the growth, the product development, and the marketing programs required for long term success. The challenge for the current commercial providers will be to finance

and manage their growth so that they end up among the winners of this game.

About the Author:

Robert Larribeau, Jr., is currently an independent consultant who has worked in the computer and telecommunications industry for the last 30 years. He has held a variety of marketing and engineering positions working with data communications products. He has been working with ISDN technology and applications for the last seven years. You can reach him at p00136@psilink.com.

In The Next Issue:

In the next issue of *The Internet Business Journal* (August/September), Robert Larribeau will continue his analysis of the Internet in the article, *The Future for the Commercial Internet Service Providers*. Stay tuned as IBJ helps prepare you for the future of commercial Internetworking.

Internet Business Snapshot

"I ordered CDROMs via the Internet, though the supplier is not actively publicizing on the Net. I also asked for documentation. I find this extremely helpful. Having got hold of the supplier's address, I e-mailed a request for information and catalog, then ordered by e-mail and had the stuff on my desk near Paris, France, within a week. As long as businesses do not send unrequested e-mail, and do not clutter our bulletin boards, mailing lists and newsgroups, this is a great service."

-- Bernard Lang, INRIA

P.S. I would like to see more suppliers have an Internet address. It makes my life a lot easier

The Internet is growing at a rate faster than any medium in the history of human communications

In April, 1993, the NSFNet Backbone Service carried 6.5 terabytes of information traffic.

THE *catching the* COMMERCIALIZATION *ear of* OF THE *ten million users* INTERNET

BY MICHAEL STRANGELOVE

The Internet, which connects over 9,000 sub-networks and ten million users, is soon to be transformed into the largest networked market in the world. This transformation will take place as a result of the High Performance Computing Act of 1991, introduced by then Senator Al Gore. Now Vice-President, Gore has committed the Federal Government to spending three billion dollars over the next five years to transform the Internet into the National Research and Education Network (N.R.E.N.).

For better or for worse, this transformation is often referred to as the coming commercialization of the Internet and may be the key to your business gaining a competitive edge in both local and global markets. This article will focus on the present commercial uses of the Internet and leave speculation about the impact of N.R.E.N. for some future column.

\$12 MILLION FOR PREPARING THE WAY

An early indication of the scope of the commercial opportunities within the Internet is seen in the \$12 million worth of grants awarded to AT&T, CERFNet (a General Atomics project), and Network Solutions, Inc.

These grants have been awarded by the National Science Foundation to provide basic organizational and informatic services for NSFNET, the National Science Foundation national data network that is the backbone of the Internet. This represents a dramatic shift in policy by the NSF, which spends more than \$10 million annually to keep the NSFNET operating.

AT&T will maintain a directory of directories, build database servers, and provide training services to other networks. CERFNet will establish a reference center, called INTERNIC, which will provide a variety of online, print and CD-ROM training and documentation. Network Solutions will take over the task of assigning Internet addresses and domain names from the Defense Department. It is obvious that the NSF is preparing to reverse its policy of prohibiting commercial activity on the NSFNET.

CURRENT INTERNET BUSINESSES

When it comes to making a dollar on the Internet, not all is future tense. Present Internet-based business enterprises include software development for Internet search and retrieval systems, a variety of publishing ventures, document delivery, and database services. The following will briefly survey some current Internet-based enterprises.

Bunyip Information Systems (info@bunyip.com), a Canadian firm based in Montreal, develops and markets a range of Internet information tools and services. Their first product offering was the archie indexing system. The archie system is now a commercial product licensed by about 20 sites around the world, including both AT&T and CERFnet.

Users of the archie system currently can track and locate over 3,000,000 files of information at over 2,000 archive sites across the Internet. Peter Deutsch and Alan Emtage developed archie while students at McGill University in Montreal. archie is now a standard Internet search engine.

With this success behind them, Peter notes that "As you well know, Canada doesn't yet have much of a commercial Internet market. However, I can assure you that at least one company is managing to pay its bills entirely on income from work on commercializing Internet information services through sales to the U.S.

and overseas." Bunyip Information Services is only one of many growing software companies that have found a niche on the Internet.

Along with software development, another fast-growing field is Internet-based publishing. There are now over a dozen guides to the Internet available in hardcopy and a dozen more forthcoming in 1993. In addition, there are three magazines devoted to the Internet, and many publishing houses are beginning to offer complete catalogs and online ordering through the Internet. Presently, at least five Internet-based electronic serials are charging subscription fees.

Ken Laws (laws@ai.sri.com) is another Internet entrepreneur. After serving as the National Science Foundation's program director for robotics and machine intelligence, Ken decided to earn his living with a career-oriented newsletter for computer scientists. NSF gave permission for trial use of NSFNET in the delivery of this service to the research community. Today, the weekly *Computists' Communique* is a leading example of a for-profit Internet-based newsletter.

An umbrella Internet business service is The Internet Company, (raisch@internet.com), which provides a commercial presence on the Internet for providers of goods and services. Dialog, Mead Data, Dow Jones, Lexis/Nexis and other online databases are using the Internet as an alternative access to their pay-for-use services.

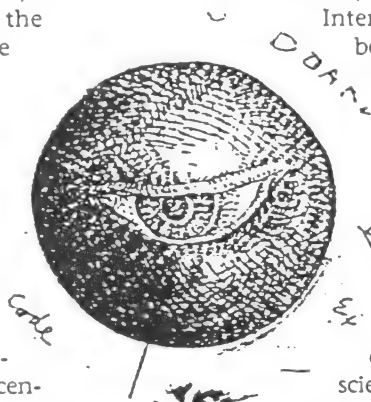
Counterpoint (fedreg@internet.com) provides delivery of the U.S. daily *Federal Register* newsletter using a variety of mechanisms, including Gopher, WAIS, FTP, as well as online interactive access. Prices for the *Federal Register* range from \$500 per year to \$2000 per year for unlimited access via Gopher and WAIS.

Most major computer manufacturers and software companies now provide some form of user support through the Internet (including software upgrades), and there are literally thousands of businesses with an Internet e-mail address.

The next few years will provide a rare opportunity for innovative and enterprising business ventures in the largest undeveloped and fastest growing market for the computer and information industries.

Readers who e-mail me at 441495@acadvm1.uottawa.ca will receive an extensive bibliography of Internet manuals, guidebooks, and hypertext guides and a general information file about business on the Internet. Be sure to tell me a bit about your interests in the Internet and what you'd like to see in future columns. ☐

Michael Strangelove is the Publisher of The Internet Business Journal: Commercial Opportunities in the Networking Age. He can be reached at 441495@ACADVM1.UOTTAWA.CA.



By Hannah Holmes

Telecommuting

**Yes, it saves gasoline,
air pollution, driving time, and
stress — wait — does it
save stress?**

IT'S 2:00 PM AND I'M SITTING AT MY DESK IN SWEATS AND A DOG-HAIRY SWEATER. My slippered feet rest on a stack of books. Over the phone, I'm conducting an important interview — the slippers don't show at all in my voice. As my source talks, I take notes, the phone propped against my shoulder. I ask him a question, and as he starts to answer, my dog Typo sits up and says, "woof!" He goes to the top of the stairs, spots a serial-killer at the door, and says, "bowowowowow!" ☎ There is a moment of silence on the other end of the phone, and finally, "That sounds like a big dog." ☎ "Heh, heh," I say, stretching to line up a clear shot with my plastic coffee mug. "Could I put you on hold, just for one moment?" ☎ I have no hold button, so my esteemed source hears me thunder down the stairs and battle Typo for access to the UPS man. I am panting unprofessionally when I return to the phone. "Now — remind me where this conversation was headed?"

PHOTOGRAPHY BY

**Christopher
Harting**

FOR THE LAST TWO YEARS, I'VE BEEN A LONG-distance employee of GARBAGE, hooked up by telephone wires to an office that's 80 miles away. My daily commute amounts to 19 steps, 11 of them being stairs. "Oh, that must be so great!" coo envious colleagues, corralled in office buildings in Manhattan or Chicago. "Do



you go to work in your pajamas?" While sleeping apparel is the first association many of the office-bound make with telecommuting, there do exist reasons to telecommute that are completely unrelated to either neckties or nylons.

The American commuter drives almost 4,000 miles to work and back each year, burning 190 gallons of gas, according to a survey by the U.S. Department of Transportation. The American commute rings up some severe environmental consequences each year:

- 11 million tires worn out.
- 23 billion gallons of gasoline burned.
- 219 million tons of greenhouse-gas CO₂ emitted.*
- 1 million tons of acid-rain precursors, nitrogen oxides.*
- 1.4 million tons of non-methane hydrocarbons, including carcinogenic benzene.*
- Smog, smog, smog. Smog is brewed when sunlight cooks auto emissions. It stunts plant growth, and causes breathing problems for animals, humans included.

*At 20 mph, and air temps of 50°F. Emissions increase with cold and extreme heat, and with engine speed.

But hang on — pollution and pajamas aren't the end of it. Jack Nilles, a Los Angeles-based consultant and father of the telecommuting concept, says people get 5 to 19 percent more work done when they stay home. This is reported by managers, who are most likely to resist letting employees out of sight, and least likely to overstate the benefits. And, because when one employee telecommutes everyone else

must be more thoughtful and organized, overall productivity may also rise.

And there's time. Many telecommuters need to replicate the 9 to 5 day at home. But those who

need only to accomplish a set task can choose their most productive hours, freeing up other time. Telecommuters also save the time they'd normally spend preening for the office, and driving time. Many also report that, out of necessity, they learn to compartmentalize their time better than they ever did in the office, so that work and home don't overlap. Overtime is much less traumatic at home, and sick days are fewer — for my part, I occasionally wake up feeling just lousy enough that I don't want to leave the house, but good enough to put in a day of what one telecommuter calls "brainless tasks." For the telecommuter, all this adds up to a feeling of control and efficiency — two important ingredients for good work.

"Could I put you on hold, just for one moment?"

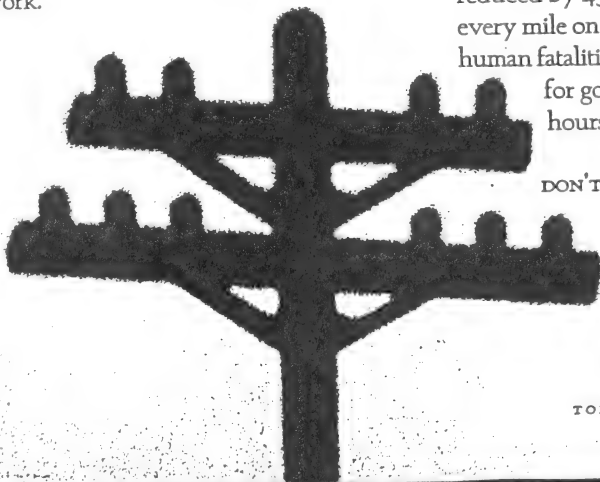
—HANNAH HOLMES
The Author

And don't underestimate the value of a healthy, home-cooked lunch. This is how my mid-day break often fits into my routine: I light a low flame under a grilled cheese sandwich. I lean on the sink and watch sparrows squabble over the bird feeder in the backyard. The "home phone" rings, and I chat with a friend. The "work phone" rings. I slam down the home phone, and leap up the stairs. It's Mr. Big and Important from the Federal Hyperbole Agency — a crucial call I've been waiting for. He enlightens me and enlightens me and enlightens me until the smoke alarm goes off: Lunch is ready.

If this sounds like the lifestyle you want to enjoy, consider joining the 3 to 6 million people who already telecommute at least one day a week, people who work for Apple, IBM, Pacific Bell, Sears, Travelers, and countless other businesses, and for numerous state and federal governmental departments. The high cost of office space, the lengthening commute, and the happiness and productivity of telecommuting employees, plus "trip reduction" laws like California's (businesses must reduce, by hook or by crook, the number of car trips employees make), are making it easier for employers to say yes.

Jack Nilles estimates that by the year 2000, some 25 million people could be telecommuters. If 50 percent of car commuters were to spend one day a week off the road, the annual gasoline savings would be 2.3 billion gallons. Wear and tear on streets and automobiles would be reduced by 45 billion miles. And since every mile on the road carries the risk of human fatalities, add 765 lives saved, and for good measure, a few million hours of precious time.

DON'T, HOWEVER, IMAGINE WORKING at home is simply a matter of bringing home some work and finding your slippers. The dangers are



many, and you'll do well to learn from the sad awakenings of others:

- The dang baby has no respect for your privacy. Telecommuting is only an alternative to day-care to the extent that it makes your schedule more flexible. Most telecommuters rely on outside day-care. Even a pet can unhinge a telecommuter. "I tried telecommuting one day," says Ellen Russell, who administers the federal government's telecommuting program, Flexiplace. "I was way-laid by my dog digging up an animal in the yard. I ended up taking a leave day."

- Your co-workers divide up your belongings. Telecommuting consultant Gil Gordon recommends no more than two days a week at home. Otherwise you risk losing your feel for day-to-day operations at the office.

- "Finally! I got hold of you!" If outsiders need to reach you, they may be irked by the extra phone call. They may also assume you're a freelancer or consultant.

- The Bureau of Labor would sue if they saw your crummy office. One of the fringe benefits of

working for the sister magazine to *Old-House Journal* is that we have old, very beautiful offices. My home office is old, too — old, drafty, and dumpy. Also consider your neighbors. The

teenager next door to my first telecommuting house liked to skip school and broadcast moldy Bob Dylan tunes to the neighborhood. Another woman gave up telecommuting when she discovered that the neighbor's parrot blabbed all day.

- A great tax write-off! Sorry. Your home office-space must be your principal place of business, which rules out part-time telecommuters. Full-timers must prove that the home office exists "for the convenience of the employer." However your accountant interprets this, you'll only know for certain when you're audited.

EVEN IF THE MECHANICAL DETAILS SEEM EASY to master, believe me when I tell you the biggest obstacles will lie beneath your cranium. Some people were just not meant to telecommute.

- Guilt. At first, if the ringing phone caught me peeing, I would panic. "Oh my god — they're going to think I took a day off!"

When I encountered sage federal-government advice on this very dilemma in a brochure ("Use an answering machine."), I cracked up, thinking of all those televirgins who dread being caught with their pants down.

I have matured. Knowing it's an added hassle for people to reach me, I still make a

point of giving great phone service. But inside, I've relaxed. I have realized that the times I wander downstairs for a carrot are the times I would have ambled into the office library, or taken a gossip break.

If you suspect you'd end up in front of the TV with a carton of ice cream, don't argue with yourself. But if you think you can beat the temptations, at least be prepared — Gil Gordon recommends harnessing them. "We tell people to structure their distractions as rewards. Like, 'If I get this report written by noon, I'll go up and watch that episode of *Northern Exposure* I taped last night.'" The fact is, you'll probably work with more intensity, and will require more mind-refreshment than you do at the office. Like your supervisor, you'll need to think in terms of results.

- Carrots. There's a special category of temptations that are essential to life, but

"I wish there was a time lock on the refrigerator."

—ANDREW SWARTZ
An Apple Computer telecommuter



which, in too-close proximity, can be deadly: food, friends, and spouses. Some would add cigarettes and coffee.

There are horror stories about people who give up telecommuting as the diet plan of least resistance. "I wish there was a time lock on the refrigerator," sighs Andrew Swartz, who telecommutes three days a week to Apple Computer. Likewise, smokers may find negative reinforcements in short supply at home.

Where spouses and partners are concerned, I have experienced both ends. The telecom-

TELECOMMUTING

Whether he's working at the office or at his house 45 minutes northeast of the city, on in London or Moscow, Milra (his only name) uses e-mail to stay in touch with clients, co-workers, and friends. When he travels, he stays connected via the company's lap-top computer and modem.

When he asked my e-mail the next day, he responded. As it turns out, Milra is just a master of e-mail for electronic mail that computer users can send each other if they belong to the same network. The small San Francisco company he works for recently brought e-mail to Russia.

Milra echoes a complaint common among computer programmers — the home computer isn't as powerful as the office machine. "I tend to save my work for the faster computer," he says. He spends 10 hours a day and 10 days in the office filling the evenings with the home computer, then e-mails just e-mails.



muter's partner peeks into the office and says, "I know you're working, but we just got a letter from your rich uncle and he's been diagnosed with ... oh heck, it can wait!" On the other hand, the commuter NEVER experiences a MINUTE of solitude, because you are ALWAYS at HOME. Both roles were difficult, and I would implore anyone considering telecommuting to spend many hours thinking and talking about how the home office will affect domestic bliss, and vice-versa.

Friends are a related treachery. At my house, they inevitably show up when I'm on the phone. There's a cheery knock on the door, the dog bomb explodes, and I'm forced to cut things short. Explain your situation in advance, and good luck — I think it's hard for the office-bound to clearly envision someone putting in a full, pressure-laden day of work at home. And while singles are rare in the telecommuting ranks, we have to deal with the added threat of passing suitors. Some perverse law dictates that they'll come courting on the day you went running before work, were too late to shower, and are working in an old prom dress because everything else is dirty.

DEPENDING ON YOUR WORK, YOU MAY NEED no equipment beyond a good chair to be productive at home — in fact, some companies send employees home to insulate them from all distractions, phone included. But if you need to interact with co-workers and the world, use technology to minimize the distance between you. Generally, the employer provides the equipment and pays for maintenance, as well as phone bills, office supplies, etc.

- **ANSWERING MACHINE:** Essential. It's your secretary, voice mail, best friend. My message often states precisely where I've gone.
- **COMPUTER:** Not necessarily necessary. Even if you use one at work, you may have one day's worth of tubeless work.
- **PHONE LINES:** If you'll do a lot of

phone work at home, you'll probably want a separate line, especially if you have roommates or family.

- **MODEM:** If you pass computer disks around at the office, a modem will allow the same rapid transfer of files from home. My fax and modem share a phone line.
- **FAX:** I need to get and send lots of paper quickly — reader mail, page proofs, press releases. People with similar "hard copy jobs" should be fine with a simple \$400 model, or even a fax-modem.

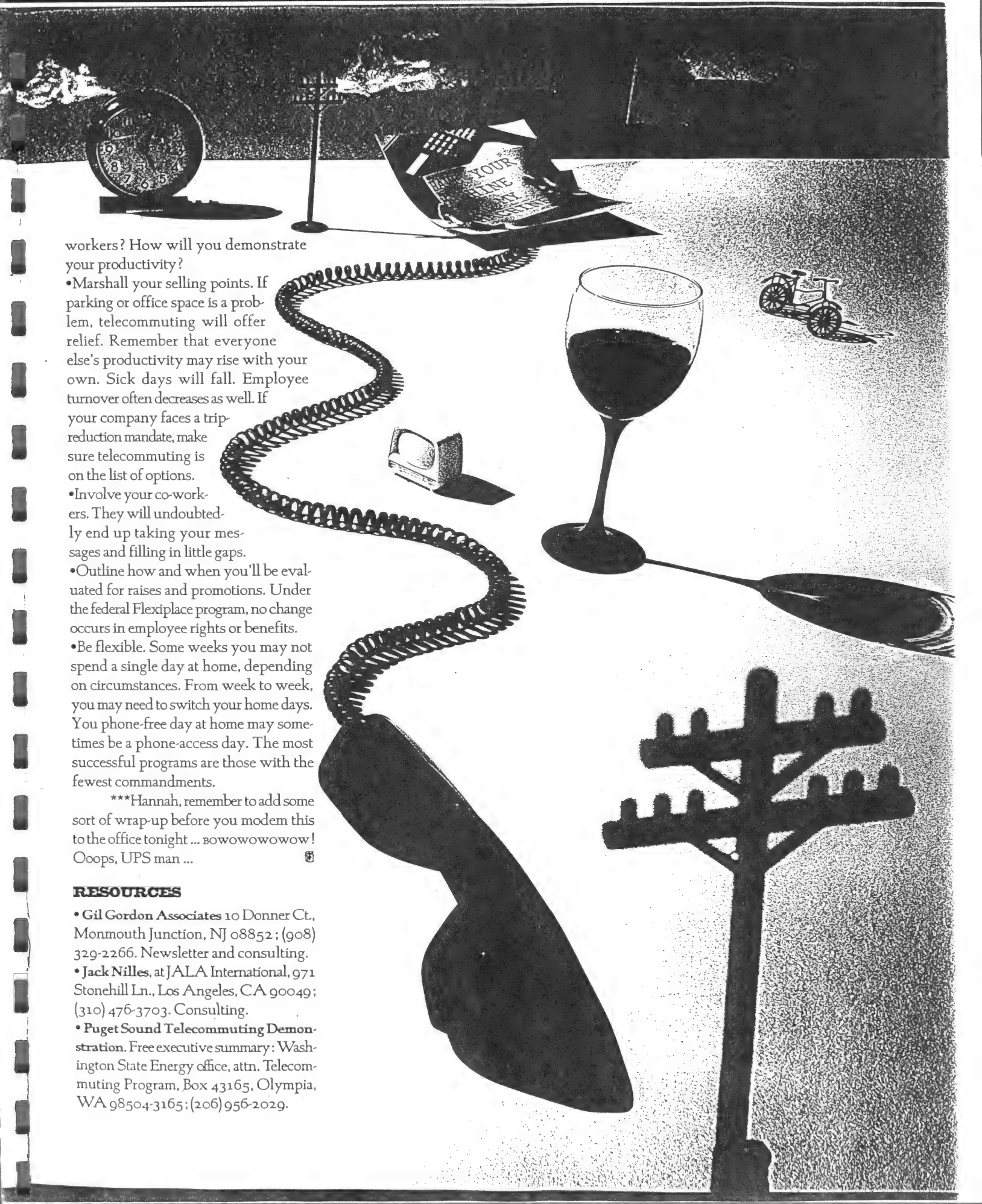
MY DEPARTURE FROM THE OFFICE WAS AMAZINGLY simple, primarily because Patty was curious and optimistic about telecommuting. I left Brooklyn on a Friday afternoon and, having ordered the phone lines in advance, was open for business in Maine the following Monday, writing, researching, editing, and handling calls from readers and co-workers.

It's seldom that easy. When Cynthia Petty, manager of Apple Computer's "Transportation Evangelism Department," told managers they'd have to let some employees go home to work, nearly half balked. "I got a lot of phone calls saying, 'How dare you do this to us?' It really opened a can of worms."

Most managers are accustomed to managing by observation — if butt is in chair, all's well. Consequently, most managers are uneasy about managing by results — setting goals and allowing employees to meet them how and where they choose. As consultant Gil Gordon says, "The issue isn't what you're doing at 2:00 pm on Wednesday, but come noon on Friday, what do you put on my desk?"

Before you pop the question, get your ducks in a row.

- **Analyze your duties.** The best tasks for home are writing, reading, editing, planning, analysis, and computer work. Can you put together one or two days' worth of solitary work a week? Will your absence create a bottleneck for your co-



workers? How will you demonstrate your productivity?

- Marshall your selling points. If parking or office space is a problem, telecommuting will offer relief. Remember that everyone else's productivity may rise with your own. Sick days will fall. Employee turnover often decreases as well. If your company faces a trip-reduction mandate, make sure telecommuting is on the list of options.
- Involve your co-workers. They will undoubtedly end up taking your messages and filling in little gaps.
- Outline how and when you'll be evaluated for raises and promotions. Under the federal Flexiplace program, no change occurs in employee rights or benefits.
- Be flexible. Some weeks you may not spend a single day at home, depending on circumstances. From week to week, you may need to switch your home days. Your phone-free day at home may sometimes be a phone-access day. The most successful programs are those with the fewest commandments.

***Hannah, remember to add some sort of wrap-up before you modem this to the office tonight ... Bowwowowow! Ooops, UPS man ...

RESOURCES

- Gil Gordon Associates 10 Donner Ct., Monmouth Junction, NJ 08852; (908) 329-2266. Newsletter and consulting.
- Jack Nilles, at JALA International, 971 Stonehill Ln., Los Angeles, CA 90049; (310) 476-3703. Consulting.
- Puget Sound Telecommuting Demonstration. Free executive summary: Washington State Energy office, attn. Telecommuting Program, Box 43165, Olympia, WA 98504-3165; (206) 956-2029.

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TECHNOLOGY

Cable Concern Plans Link to the Internet

By MARY LU CARNEVALE
And JOHN J. KELLER

Staff Reporters of THE WALL STREET JOURNAL
Cable television will connect to the Internet, information pathway to millions of personal-computer users world-wide, early next year through a direct linkup via Continental Cablevision Inc., one of the nation's largest cable operators.

The service, which could greatly alter delivery of electronic information, would allow Continental's customers to plug PCs and a special modem directly into Continental's cable lines, said William Schrader, president of Performance Systems International Inc., a Herndon, Va., network services company that is Continental's partner in the project.

The cable link would bypass local phone and other special hookups to access the Internet directly. More significantly, it would allow customers using PCs to fetch whole kinds of information, downloading quickly on books and other data from the world's greatest libraries. This text would move at information superhighway speeds — at as fast as 10 million bits a second, rather than the comparatively sluggish speed of 2,400 bits a second from conventional phone-modem hookups, Mr. Schrader said.

More than just high-capacity reception, however, the high-speed link would give users many things they can't get today. It promises to bring multimedia services through the cable line to the home or business, including TV-quality video and even high-fidelity music through the personal computer.

"This isn't some fluffy pie-in-the-sky vision," said David Fellows, a senior vice president at Continental. Added Mr. Schrader: "Other companies, such as Time Warner [Inc.] in Orlando, are talking about elaborate multimedia service tests, but our plan is small, simple and easy; this will work."

But while the new service holds much promise, no one is sure what consumer demand will be, especially at an estimated cost of \$70 to \$100 a month. Indeed, it was consumer outrage over escalating cable rates that drove Congress to pass the 1992 Cable Act.

Performance Systems, which provides a means for computer customers to hook up to the Internet system, plans to install

computer "routers" in the Continental network. These systems keep the data traffic flowing uniformly and quickly by scrutinizing the incoming information, instantly figuring out where it is headed and placing it in electronic packets before sending it on its way. The routers will be installed in the main hubs or "head-end" facilities in Continental's vast network, allowing an easy extension of the new Internet service to homes and businesses tethered to the cable company. For the customer's home or business computer, Performance Systems will provide a special computer modem to reach the service.

The two companies plan to announce the service plan today at an industry trade show in San Francisco. The first hookups are scheduled to take place in Cambridge, Mass., where Continental has many subscribers connected to Harvard University and the Massachusetts Institute of Technology.

The planned service is only the latest of uses for the fast-growing Internet, the world's biggest computer network — a network of networks, in fact. Traffic growth is estimated at a staggering 10% a month, fueled largely by new commercial, foreign and student users. A cable-TV link could well accelerate that rate.

Experts say more than 10,000 computer networks, with perhaps 15 million to 20 million users in more than 50 countries, plug into the Internet. Growth, they say, is limited only by the complexity of the interchanges at which users enter this "information highway," the model for the "information superhighway" of the future advocated by the Clinton administration.

Currently, all that binds these users is "a common protocol that lets them work together," explained Douglas Van Houweling, vice provost for information technology at the University of Michigan and a board member of Merit Network Inc. Merit, in a partnership with International Business Machines Corp. and MCI Com-

munications Corp., runs the National Science Foundation Network, the Internet's high-speed backbone.

Simplifying user access, as Continental Cablevision proposes, will determine whether Internet will serve the computing masses or remain a route traveled only by scientists, researchers, professors and students, say current users.

"We're still building the road to usability," said Ed Krol, an assistant director at the University of Illinois's Computing and Communications Service Office and author of Internet guidebooks. "We currently have one lane and a lot of men working."

Rivals' Moves

Meantime, big entertainment and telephone companies such as American Telephone & Telegraph Co., Time Warner and U.S. West Inc. are building their versions of the superhighway they say will pump interactive movies, games, home shopping and other multimedia fare through TV sets to U.S. homes.

Many Internet aficionados don't want to be left out of the home market. At a recent meeting in Amsterdam, the volunteers who figure out how to keep the network moving forward began grappling with ways to improve the Internet's ability to carry audio and video traffic. Earlier this year, Internet guru Carl Malamud launched the network's first computer-radio talk show, each week interviewing a computer expert. He's now making technical arrangements for Congress's first hearing on the Internet — to be carried live on the Internet.

Rep. Edward Markey, the Massachusetts Democrat who heads the Telecommunications and Finance subcommittee, wants the hearing to be an eye-opener for lawmakers and their aides, few of whom are familiar with data highways let alone have mastered the Internet's abstruse rules.

Just how frustrating is it? "It is as if you were to invite me to dinner and give your address in longitude and latitude," said Larry Irving, who as head of the Commerce Department's National Telecommunications and Information Administration has a lead role in shaping the information superhighway. Mr. Irving's goals include expanding access to the Internet. "Right now, it is basically utilized by computer hacks," Mr. Irving says. "We need to work with existing users to make it more accessible to the general public."

Students or employees at institutions or companies already hooked into the Internet need only acquire an access code that allows them to dial up the host computer, type in a password and log on. Others must subscribe to an on-line service such as CompuServe, Prodigy, the Well or, next year, Continental Cablevision. A growing number of public libraries also offer Internet links.

Still, the pathways to information remain tortuous. A recent first-time traveler on the Internet encountered interactive instructions such as "Try Gopher . . . and WWW, too. IMPORTANT NOTE: If you try GOPHER or ARCHIE or WAIS and the screen display does not look right or respond properly . . . Read the HELP file on Troubleshooting (type HELP at the SIG main menu and SCAN the files for the Troubleshooting file)."

Finally connected to the library at Italy's University of Pisa, the user sought information about the Leaning Tower but received instead a yarn about an oriental witch in a tower.

Despite obscure computerese, Internet in the past three years has begun to reach primary and secondary schools, businesses and many individuals with PCs, modems and patience. Most individuals use dial-up services such as CompuServe, while businesses generally get connections through commercial providers such as Performance Systems and Advanced Networks & Services of Ann Arbor, Mich.

"The thing that ropes most people into using the Internet is electronic mail with colleagues all over the world," said Mr. Krol at the University of Illinois. "That's becoming more important, especially as travel budgets tighten and people want to save time as well as money."

Shakespeare and Beer

Once on the network, users can subscribe to "mailing lists" that let them receive newsletters or exchange electronic mail on hundreds of topics ranging from computer and network management issues to quilting, railroads, Shakespeare, 3-D photography, brewing beer at home and music. The Internet also boasts a large collection of support groups for people with various ailments from AIDS to workplace injuries.

On campus, Mr. Krol said, "students get Internet accounts as they walk in the door, and for those in engineering and hard sciences, it is becoming harder and harder to survive without electronic messaging to communicate with professors and peers."

Much business demand for Internet connections is driven by newly minted college graduates, many of whom were hooked on the Internet before their first semester. Joel Holveck, a recent San Angelo, Texas, high school graduate with a perfect 800 on his math SATs, chose Texas A&M based in part on the prospect of a direct Internet connection in his dorm room.

As their students become more reliant on the Internet, universities are scrambling to upgrade computer connections to dormitory rooms. At Illinois, Mr. Krol says, about 35% of the students use computers in their dorm rooms, and the university has begun linking dormitories directly to the campus network.

The New York Times



Sal DiMarco Jr. for The New York Times

"The future of cable television is brighter than ever, and so is ours," said Ralph J. Roberts, left, chairman of Comcast Corporation, an \$83 million company

that is the country's third-largest cable provider and fifth-largest independent cellular phone company. With him was his son, Brian, Comcast's president.

Head Start on Data Superhighway

By ANTHONY RAMIREZ

As the boundaries blur among the telephone business, cable television and wireless communications, no company may be better prepared to navigate the new landscape than the Comcast Corporation, the nation's third-largest cable provider and fifth-largest independent cellular phone company.

For years, the smart money bet that only the conventional local telephone companies would have the money and expertise to build the information superhighway that would bring phone calls, data communications and video-on-demand to American households. But now cable television companies plan to deliver the

same services at lower cost. And soon, the cable companies may outrun the phone companies by linking wireless communications services to their lower-cost cable networks.

"The future of cable television is brighter than ever, and so is ours," said Ralph J. Roberts, Comcast's dapper 73-year-old chairman, who runs the company with his son, Brian, 34, Comcast's president.

Alone among the major cable operators, Comcast has its hands in almost every sector of telecommunications. The exceptions are paging and long-distance, and even long-distance may eventually change if something comes out of Comcast's continuing talks with A.T. & T. and the MCI Communications Corporation over multimedia technology.

These are exciting days indeed for Comcast, the Philadelphia-based company that the Robertses have built from an \$83 million concern a decade ago into one with revenue of \$900.3 million last year.

Two weeks ago, the CBS television network capitulated to Comcast and other cable operators. Under a new Federal law, CBS had wanted cable companies to pay it fat cash fees for the right to carry network programs like the top-rated "60 Minutes."

But in an example of the cable industry's newfound power, CBS agreed to be compensated not in cash, but with a new CBS cable channel. Such a channel, devoted to public

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Comcast's Head Start on Data Superhighway

Continued From First Business Page

policy, could win new subscribers for Comcast but mire CBS in development costs.

Earlier in the summer, A.T. & T. had agreed to buy McCaw Cellular Communications Inc. for \$12.6 billion, one of the largest deals ever and one that enhanced the value of most cellular operations, including those of Comcast. Comcast's stock has been trading in the low 30's recently, well above its 52-week low of \$13.50. Yesterday in Nasdaq trading, the shares were down 12.5 cents, closing at \$30.375.

Big Day Approaching

Comcast, like dozens of other big communications companies, is eagerly awaiting Sept. 23. That is the day the Federal Communications Commission is to announce ground rules for personal communications services, or P.C.S., a nascent industry that aims to provide cheaper and smaller wireless devices for the mass market. These devices could include pagers with built-in answering machines, wireless fax machines and

even tinier pocket telephones than the shirt-pocket versions available today.

The F.C.C. permitting, cable operators like Tele-Communications Inc., Time Warner and Comcast plan to bid next year for the newly available radio frequencies that will make these devices possible.

In P.C.S., as with other emerging technologies, cable operators believe they have an edge over the local phone companies. The reason: traditional copper telephone lines do not have the capacity to carry much more than voice conversations. And even though phone companies like GTE and Pacific Telesis have laid thousands of miles of ultrahigh-capacity fiber optic lines connecting cities, they have laid next to none that lead directly to neighborhoods and individual homes.

To extend fiber optic lines to neighborhoods would require a huge rewiring effort by the phone companies involving up to 200 million miles of local lines nationwide, or the equivalent of four times the distance between Earth and Mars. And the price would be an astronomical \$276 billion, according to a variety of analysts.

TV cable, unlike older phone lines, has spare capacity.

By contrast, the cable industry already has a high-capacity network available to nearly as many homes as the phone network is. (About 64 percent of the nation's households subscribe to cable television, but the actual cables "pass" 96 percent of households — nearly as many as have a telephone.)

Moreover, this cable network totals only a million miles, and only 15 percent of the cable system — the long-haul part between neighborhoods and between towns — might need to be replaced with high-capacity fiber optic lines. The cost: \$26 billion, according to cable industry estimates.

Why so little rewiring? Because unlike copper phone lines, most of the television cable already has adequate carrying capacity and would not need to be replaced. The coaxial cables

serving most homes have 200 times the information capacity of copper telephone lines. Faced with only a fraction of the rewiring cost the phone companies, cable operators like Comcast would have the edge in pricing services cheaply. With that advantage, cable operators might offer wireless service cheaply.

Using radio transmitters inside a house or office building, where local calls are difficult to make to and transmitters outside buildings attached to the telephone poles to hold up cable lines, they might be able to provide seamless service between the living room, the backyard, the street and the office. Comcast and others have experimental P.C.S. services from Federal regulators test the idea.

'Why Reinvent the Wheel?'

"The cable industry can take advantage in both the wired and wireless worlds of the billions of dollars already invested," said the young Mr. Roberts, Comcast's president. "Why reinvent the wheel?"

The cost advantage that cable companies may have in building the information superhighway is getting increasing attention from analysts. Indeed, some view U.S. West's agreement in May to invest \$2.5 billion in Time Warner venture as a tacit admission of the argument for cable.

By agreeing to develop Time Warner's advanced technology for consumer video services, U.S. West, phone company, was conceding it was more economical to revamp cable television than the phone network, these analysts say.

But others contend that the cable industry does not have the borrowing capacity to finance its goals, and they concede are technically feasible. Still others simply think the industry argument is wrong.

"Coaxial cable is a 30- or 40-year old technology and has a high maintenance between failure; in other words it breaks down a lot," said Kenneth McGee, an analyst at the Gartner Group in Stamford, Conn. "And I know how to lay down fiber optic cable better than the phone companies?"

Possible Alliances

But in Comcast's view, telephone companies need not necessarily be antagonists. Comcast has been talking with the American Telephone & Telegraph Company and, separately, with A.T. & T.'s long-distance unit MCI about forming a venture in multimedia, the hazily defined convergence of telephones, computers and television into applications like video-conferencing.

Comcast has nothing to announce about its talks with the two companies, Mr. Roberts said in an interview, but he added that a link with

A company's edge: No. 3 in cable and No. 5 in cellular.

long-distance carrier could benefit all parties.

One problem with A.T. & T.'s new videophone system, for example, is that even though it costs \$2,000 for a pair of phones, its quality leaves something to be desired: the picture is blurry and one-third slower than regular television because the signals must be squeezed through low-capacity telephone lines. The cable television network, by contrast, would have no problem carrying a television-quality video phone call.

"Would people pay 25 cents a minute to, once in a while, have a video-conference call with a friend in another city?" Mr. Roberts asked. "The picture would be full motion and absolutely as good as a regular TV set because it is a regular set. I think people would pay for that."

Comcast has a good track record lately in guessing what people will pay for. Analysts expect the company to exceed \$1.3 billion in revenue this year, up from the \$900 million of last year. Cash flow, the crucial indicator of health for cable companies, is expected to rise nearly 60 percent, to

\$625 million from the level a year earlier. (Much like other highly indebted cable companies, Comcast has been reporting losses since 1987.)

Entry to Mobile Radio

Comcast has a large stake in Nextel, formerly Fleet Call, a specialized mobile-radio company that later this year will provide cellular-like competition to cellular carriers in some major cities. In many ways, Nextel is a rehearsal for P.C.S. Using new wireless phones from Motorola, Nextel can offer state-free digital service that also provides a paging service that delivers short text messages.

In Britain, where regulation is less strict than in the United States, Comcast offers both cable television and phone service to consumers. Comcast is learning valuable marketing lessons for the day it can do the same in the United States.

And back home, Comcast has large investments in Teleport Communications Group, which provides an alternate local phone service to that of the Baby Bells, catering mainly to business customers. The other investors are also cable companies like Tele-Communications Inc. of Denver.

"Long term, the cable companies want to look like the phone companies with ubiquitous coverage," the younger Mr. Roberts said. "We've wired up nearly all the homes, but not the businesses. So that's why we're investing in Teleport."

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